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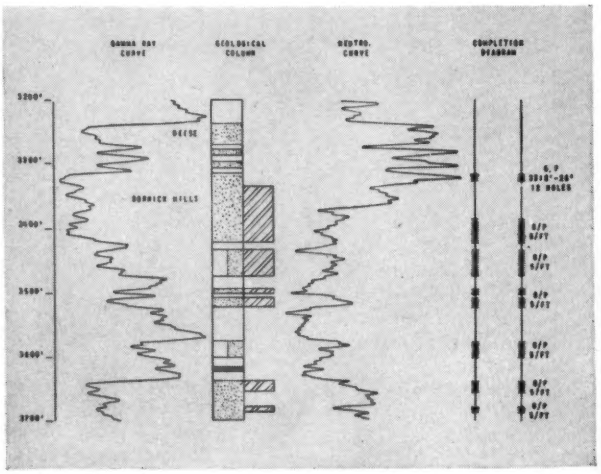
In this Oklahoma area, a large part of the production comes from a flank type "stratigraphic trap" structure with lenticular, usually very silty, sands.

After setting 7" casing, this particular well was perforated with 12 holes between 3318' to 3328': it flowed 30,000,000 cu. ft. of dry gas before it was squeeze cemented. Then a Lane-Wells Combination Radioactivity Well Log was run.

Based on the Neutron Curve, the well was re-completed. New perforations were placed, 5 per foot opposite the sand zones from 3385' to 3700'. The well flowed 1500 BOPD; gas/oil ratio 600/1.



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the OIL AND GAS JOURNAL

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CLEAN UP THE "WORKING SURFACE" OF YOUR CASING

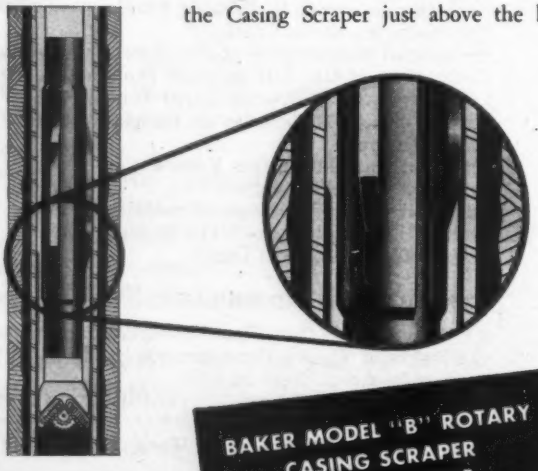
Read these facts about the Baker Rotary Casing Scraper

Have you ever tried to run testing tools or a swab, and had the rubber packing unit or the rubber cups so badly cut, torn and mutilated that the run was a failure? The chances are that trouble was caused by burrs from gunshot holes or by the sheath of hardened cement or mud which remains on the inside walls of casing, even after a bit of maximum possible gauge has been used to drill out after a cement job.

Until quite recently there was no fast, simple method of overcoming these difficulties. Now, however, it is truly a waste of time, temper and money to leave any obstructions adhering to or protruding from the "working surface" of your casing. The Baker Rotary Casing Scraper quickly, positively and economically removes *all* obstructions from the inside walls of casing, leaving the surface clean and smooth—ready for *immediate* testing and completion—and in good condition for any remedial or work-over operations *one year or ten years in the future.*

(Left) With only four springs back of each blade, burrs from gunshot holes are readily removed.

(Below) Notice the "trouble-making" sheath of cement left behind the bit, and how the blades remove it.



BAKER MODEL "B" ROTARY CASING SCRAPER
Product No. 620-B

STRONG, SIMPLE CONSTRUCTION

The Baker Rotary Casing Scraper consists of a strong body in which three long, reamer-type, hard-faced blades are vertically mounted. These three blades form an expansible reamer due to the fact that they are pressed outward against the inside walls of the casing by a number of coil springs. This self-equalizing feature insures constant, uniform contact with the walls of the casing, and is one of the secrets of the clean, smooth scraping action. Hard facing is applied in a flat, rectangular recess to form the long cutting edge of each blade, and a worthwhile amount of scraping can be done before the blades are dulled.

Ample circulating areas permit free disposal of cuttings; the streamlined exterior of the body insures ease in running-in; and if by accident the Casing Scraper is run out of the lower end of the casing, there is no difficulty in bringing it back inside for removal from the well.

FACTS ABOUT ITS USE

The ideal time to use a Baker Rotary Casing Scraper is while the rotary rig is still up and the crew is on hand. Install the Casing Scraper just above the bit when going in to drill out the cement shoe. Even when a bit of the maximum possible gauge is used for drilling-out, a thin, hard sheath (or skin) of cement will still remain adhering to the inside walls of the casing. The Baker Rotary Casing Scraper removes not only this hardened sheath of cement, but also scrapes away all mill scale, and smooths out rough areas. The inside of the casing is left clean and smooth, ready for trouble-free, down-hole work immediately thereafter, or at any future time.

If the well is gun perforated, then a second run of the Baker Rotary Casing Scraper will remove any burrs left around the gun-shot holes. The slight additional cost of this second run is negligible when you consider what the clean, smooth casing will mean when any future down-hole work is done.

If at a later time, after the rotary has been removed, obstructions on the inside walls of the casing interfere with operations, the Baker Rotary Casing Scraper still can be employed successfully. By running the Casing Scraper on tubing, and rotating manually with tongs, limited areas may be scraped; while several hundred feet of casing have been scraped by rotation of the tubing with an endless spinning rope, or by means of air tongs.

IT'S EASY TO HAVE THE "WORKING SURFACE" OF YOUR CASING IN PERFECT CONDITION

Baker Rotary Casing Scrapers are furnished on a low-cost rental basis in domestic fields, and *your* crews can run them easily and successfully to scrape the "working surface" of the casing before running casing, tubing, liners, swabs, testing tools, cement retainers, packers or other similar tools. It pays off in savings of time, temper and money.—Why not call the nearest Baker service engineer and start enjoying these benefits in *your* wells?

BAKER OIL TOOLS, INC. LOS ANGELES • HOUSTON • NEW YORK

THE OIL AND GAS JOURNAL

Storage

A READER points out that our stocks of crude oil and total stocks of all oils are low when compared to inventories 5, 10, and 20 years ago. He is correct. So far as crude-oil inventories are concerned they long since lost their market significance. At the close of 1929 crude stocks were 428,445,000 bbl. As of August 7 this year, according to the Bureau of Mines, they were 220,255,000 bbl., although consumption this year is running about 100 per cent greater than in the boom year of 1929.

The explanation for that operating phenomenon lies in changed practices. From the birth of the industry until the start of the thirties comparatively heavy crude-oil storage was necessary to span the gaps between the flush production of new fields. The application of conservation principles, including proration, ended that feast-and-famine method of operation and the need for large crude-oil inventories. With increased knowledge of reservoir conditions operators learned that it was practical to keep crude-oil storage underground. Hundreds of tanks were emptied and salvaged.

Thus operators have been able to maintain crude storage to bare working requirements, with facilities available to quickly increase withdrawals from proven underground reserves when the need arose. That explains why operators were able to expand war supplies rapidly, although as a group they entered the emergency with substantially less crude oil in tanks than they had 5 to 10 years previously.

Developments in product storage have not paralleled those of crude oil as to basic changes in all respects. It is now apparent that some refiners and terminal and bulk-station operators do not have the product tankage required to back up seasonal changes in demand. During the war and since until recently this was not generally important. Demands were so large and supplies so limited that many refiners oftentimes loaded tank cars or made deliveries to product pipe lines direct from plant rundown tanks.

Now, more permanent storage is required. Within the past few weeks, for example, the residual-fuel market has been weak in some areas because refiners have not had the tankage needed to store the product in excess of current shipments to await the season of largest consumption.

This means market troubles, not only in heavy fuel but in other products, when all refiners have to project their operations over a yearly period and buyers no longer are knocking at the refinery gates daily for products regardless of the season.

It is true that refiners now have more flexibility in their yields of products, but what can be done economically is dependent on comparative prices as well as developments in the processing arts. Large-capacity storage is still an essential plant facility. This requirement should have full consideration in the expansion and modernization programs now under way.

Truman Stands by Prediction of Fuel-Oil Shortage This Winter

by Bertram F. Linz

WASHINGTON.— President Truman last week stood firmly behind his prediction that a shortage of fuel oil on the East Coast is inevitable next winter, despite statements by industry and government officials to the contrary.

Asked at a news conference August 19 about his reaction to industry statements that the supply situation has cleared up, the President said he still doubted that a shortage could be averted, although he sincerely hoped the industry was right.

It all depends, Truman said, on the severity of the weather next winter.

In other government circles, The Oil and Gas Journal's evaluation of the situation in its August 19 issue was received more cordially, and officials agreed that, barring major unforeseen setbacks, the situation was generally satisfactory. The Journal's analysis of the current statistical situation in the petroleum industry as given in last week's issue with the conclusion that a threat of oil shortage is behind us, has been widely quoted in newspapers and on the radio throughout the country. The interest that has been manifested no doubt was responsible for the inquiry at the President's press conference Thursday.

Ball Optimistic

While there will continue to be possibility of temporary and local supply difficulties during periods of exceptionally severe weather, "the general outlook for heating oils next winter has shown a considerable degree of improvement during the past several months," it was declared by Max W. Ball, director of the Oil and Gas Division, in a letter to Sen. Brien McMahon of Connecticut, chairman of the Senate interstate commerce oil subcommittee.

"The very considerable increase in crude oil production and refinery runs that continues to be realized, plus a timely return to the high yields of kerosine and fuel oil attained late last winter, should make it possible to avoid any significant shortages of products on the consumer level even though, over-all, petroleum continues to be in scarce supply."

So far has the pendulum swung, Ball told McMahon, that before the period of peak demand begins, the industry will be in trouble with respect to storage capacity. Had plate been available for additional facilities, the industry could have entered the winter period with much higher inventories.

Ball reported that for the 10 weeks ended August 7, crude production averaged 5,475,000 bbl. daily, an increase of 391,000 bbl. daily over the corresponding period a year ago, and refinery runs averaged 5,659,000 bbl. daily, an increase of 503,000. Total stocks on August 7 were 31,613,000 bbl. greater than on August 9, 1947, despite a decrease of 7,524,000 bbl. in crude inventories.

Military requirements for the remainder of this year now have been substantially met, he said, and although military requirements recently were increased because of the Berlin airlift, the impact on the civilian supply will be slight.

"Generally," Ball said, "it is believed that if a reasonable degree of conservation in the use of petroleum products is observed by the consuming public as it was last year, and if the successful system of state fuel coordinators is continued, such difficulties as occur will be local and of very brief duration."

Earlier in the week, the House interstate commerce committee, which has been making a continuous study of developments in the oil picture, also agreed that the outlook for this fall and winter is more favorable but, recollecting last year's experience, cautiously refrained from expressing the opinion there was no longer any need for concern. The committee here apparently had in mind suggestions of government officials that the adequacy of our supplies depended to considerable extent upon the uninterrupted and increasing flow of oil from the Middle East, and labor, weather, and other uncertainties.

Steel Sales, Distribution Patterns To Be Studied by Senate Committee

WASHINGTON.—A survey of sales and distribution patterns in the steel industry has been launched by the Senate small business committee.

Questionnaires are being sent to the entire steel industry, seeking information on sales by companies to their integrated operations and a comparison of such sales with those to independent companies, at all levels of operation.

The study will go into the oil-pipe situation, which the committee some weeks ago sought to cover in across-the-table discussions with steel-company representatives who were asked to set up an allocation program for small business which would channel more steel into steel-starved areas and set aside a small amount of steel for hardship cases.

Announcing the survey, Sen. Edward Martin of Pennsylvania, chairman of the steel subcommittee, said that disruptions to normal channels of trade due to withdrawals of distribution, and increased integration in the steel industry had caused lessened supplies of steel to smaller business. The situation, he declared, has become increasingly serious during the past year.

The House small business committee also prepared to make an investigation of the situation of the smaller operators in the oil industry, particularly the independent distributors, in connection with a general study of monopolistic and unfair trade practices.

Over the weekend, Chairman Walter C. Ploeser of Missouri announced a schedule of hearings to open at Casper, Wyo., September 8 and closing at Houston October 12. Further hearings will be held in the East and Far West early next year.

The hearings were arranged on the basis of returns to a questionnaire sent out by the committee to develop the areas where alleged monopolistic practices were most rampant and the types of unfair competitive practices most general.

California Crude Below Gulf Coast, Taylor Says

A belief that California crude oil "is selling for as much as 25 cents per barrel under the posted Gulf Coast price" is expressed by Reese H. Taylor, president of Union Oil Co. of California in the company's report to stockholders on the first half of 1948.

Gasoline prices in the two areas are comparable, Taylor says, but he adds that "it appears that fuel oil and diesel oil are selling on the Gulf Coast for at least 47 cents per barrel more than they are in this marketing area." Crude prices, he says, cannot be compared exactly "because of different characteristics of the oils.

Stanolind Pigeonholes Plans for Synthesis Plant; High Costs Cited

MOUNTING construction costs have forced a halt in work on the huge hydrocarbon synthesis plant being built by Stanolind Oil & Gas Co. near Garden City, Kans.

E. F. Bullard, Stanolind president, said the company "has decided to discontinue the project," but added that plans now being formulated "may permit reinstatement of a similar program approximately 3 years from now."

"Present-day high construction costs and the prospect that costs will go even higher in the near future," Bullard declared, "are the determining factors which led to the decision to discontinue the project at this time."

The capital investment required for the project has more than doubled, he added, since the program was initiated 2 years ago.

To Retain Site

Stanolind will retain the plant site, which is located about 5 miles east of Garden City, but will cancel all construction and other contracts involving the project. Officials in Garden City said Stanolind officials had offered to reimburse the city for all losses incurred in planning for the development.

The Stanolind plant was one of two hydrocarbon synthesis plants under construction. The other is being built near Brownsville, Tex., by Carthage Hydrocol, Inc. Carthage officials in New York this week spiked rumors that construction there had been halted, saying the plan is "to continue work" with completion of the plant scheduled for the "middle of next year."

Bullard said that no change is contemplated in Stanolind's other construction projects. These include the chemicals plant at Brownsville and the natural-gasoline plant near Ulysses, Kans. Stanolind has contracted to buy the chemicals output of the Carthage plant at Brownsville.

The Garden City synthesis plant, known as the "Stanosyn" plant, was designed to process 100,000,000 cu ft. of Hugoton field gas a day.

Liquid Yields High

Pilot-plant data indicated a natural gasoline plant would strip 2,000 bbl. of natural gasoline and related products from the daily throughput of gas.

The dry gas was then to be fed to a synthesis plant expected to produce 5,000 bbl. of gasoline, 2,000 bbl. of distillate fuels, and 300 bbl. of heavy fuel oil from the feed gas. A by-product was expected to be 200 tons daily of oxygenated chemicals.

Stanolind planned to draw Hugoton field gas from 325 wells spread over a 200,000-acre area estimated to contain gas reserves of 7,000,000 cu. ft. per acre.

Over a 25-year period, a minimum figure for the life of the field, it has been estimated that such a synthesis plant would obtain a total liquid yield in excess of 85,000,000 bbl.

Contractors on the project included E. B. Badger & Sons Co., chemical products plant; M. W. Kellogg Co., synthesis and processing units; Foster-Wheeler Corp., oxygen plant; and Stone & Webster Engineering Corp., which began work at the plant site July 1. Stone & Webster had the contract for road construction, drainage, laying of railroad tracks, the main power plant, and other work.

Roundtable to Highlight Meeting of Compact

A governors' roundtable, highlighted by a discussion of state responsibilities and actions to assure an adequate supply of oil products, will feature the summer meeting of the Interstate Oil Compact Commission which will open August 30 in the Roosevelt Hotel, New York.

Seven governors have indicated they will attend the meeting and participate in the roundtable.

Opening day of the meeting will be devoted to meetings of the Compact's standing committees, which will make their reports following the roundtable on the afternoon of August 31.

Eight addresses will be presented during the 3-day Compact meeting. Following are highlights of the program.

Tuesday, August 31

9:30 a.m.—"Interstate Cooperation—A Concomitant of Freedom," Joe R. Hanley, lieutenant governor of New York; "Petroleum and the Public Interest," James H. Duff, governor of Pennsylvania.

2 p.m.—"Are We Running Out of Oil?" George W. Malone, Nevada senator; governors' roundtable, Gov. Beauford H. Jester, Texas, moderator.

Wednesday, September 1

9:30 a.m.—"The History and Accomplishments of the Interstate Oil Compact Commission and Clarification of Some Popular Misconceptions," Ernest O. Thompson, chairman of the Texas Railroad Commission; "The Necessity of Oil Conservation and the Importance of the Compact's Secondary-Recovery Program," William S. Livengood, Jr., secretary of internal affairs, Pennsylvania; "Examples of Cooperation in Interstate Oil and Gas Fields—Federal Control Unnecessary," Gov. Frank Carlson, Kansas.

2 p.m.—"Why There Was a Shortage of Butane in Texas Last Winter," William J. Murray, Jr., member of the Texas Railroad Commission.

Hardey Sees Hope for Valid Leases in Gulf

BATON ROUGE, La.—Even if the federal Government ultimately gains control of offshore lands in the Gulf of Mexico, there is every reason to hope that leases granted by the states will continue valid, B. A. Hardey, chairman of the Louisiana State Mineral Board, said here last week.

Precedents in other cases indicate that the Government probably would recognize prior contracts made by the states for oil drilling and exploration in the submerged areas, he said. Oil companies have paid the State of Louisiana some $18,000,000 for Gulf of Mexico leases, and three discoveries already have been made.

Hardey, who is an independent operator of Shreveport and a former president of the Independent Petroleum Association of America, said he hoped that the present dispute would be settled in favor of state ownership by action of the next Congress and President.

His remarks were made at the initial meeting of the partially reorganized mineral board. The last legislature passed a measure sponsored by the administration of Gov. Earl K. Long constituting a new board of 10 members.

The governor has thus far named only four members—Winston L. Stokes, Bunkie; Edgar G. Mouton, Lafayette; O. G. Cottins, Shreveport; and R. B. Prentice, Houma. At the meeting, Hardey was continued as chairman, and James W. Smither, New Orleans, as vice chairman, temporarily until the additional appointments are made.

Hardey recommended that the new board continue the policy of restricting offshore leases to 5,000 acres in a single lease.

Texas Commission Issues 60-Day Allowable Order

A 60-day allowable of 2,638,019 bbl. daily was set August 18 by the Texas Railroad Commission. The figure is 118,019 bbl. daily above the Bureau of Mines demand estimate. The allowable becomes effective September 1.

The commission will meet again October 15 in Dallas to determine the allowable to become effective November 1.

October 14 to Be "Oil Progress Day" in Nation's Communities

OCTOBER 14 will be "Oil Progress Day" in communities throughout the United States.

On that day representatives of all segments of the petroleum industry will seek, through plant open houses, press and radio interviews, talks, and other methods, to impress upon the general public the progress that has been made in the oil industry.

Representatives of the industry, working through district oil-industry information committees, this week were inaugurating programs in hundreds of communities to point out on that date how the oil industry as a whole and companies individually are serving the communities and their citizens.

Over-all plans for the national event have been made under supervision of the Oil Industry Information Committee, created by the industry to administer its public-relations program. Advertising layouts, posters, banners, and suggestions for local events are being supplied local committees, but, it was emphasized, the industry in each community will determine its own program for the day.

On Local Level

Ralph Champlin, chairman of the national information committee, said the day has not been established as a national, but as a community day when local activities following a general pattern will be aimed at a common objective.

The programs will be geared to the community level, Champlin said, since the oil industry, in spite of its vast ramifications, "is local in character."

"Its owners, managers, and employes are neighbors; its plants and installations are part of community skylines," Champlin said. "... Progress of the oil industry is, therefore, of immediate concern to the people of the communities, and their attitude toward the industry has an important bearing upon the opportunity of the industry to progress."

Objectives of the special day, as outlined by the information committee, are:

1. To create public confidence in the oil industry by developing a broader base of public knowledge of its progress—evidenced by its constant and extensive research resulting in improved products, higher standards of service, and ever-increasing supplies at reasonable prices.

2. To strengthen the relationships between the oil industry and the communities of America.

3. To provide incentive for extensive participation by oil men in the industry's information program on a continuing basis.

4. To present facts by which the public can more readily determine the validity of criticisms leveled at the industry.

Program for Resources Conference Is Revised

WASHINGTON. — A revised program for the international conference on the conservation and utilization of resources to be held next May under the auspices of the United Nations Economic and Social Council has been drafted by the preparatory committee, and invitations are now being issued to scientists and engineers in the oil industry to prepare articles on the subjects to be discussed.

The sessions on petroleum will cover the whole field of oil and gas discovery and production, with emphasis on techniques, new methods, and new instruments; secondary recovery, oil from shale; utilization, including conservation in utilization for space heating; oil chemistry, including the possibilities and limitations of synthetic fuel production; and underground gasification of coal.

One subject in which the United States members of the preparatory committee are highly interested is oil conservation, and it is hoped that an American oil man of outstanding reputation in that field can be secured to set up the American theory of the maximum efficient rate of production, oil-gas ratios, engineering controls, etc., as the basis for broad discussion.

It was pointed out that apparently there are several theories of conservation which do not coincide with that practiced in this country, particularly the basis on which the Russians operate their oil resources, which might be talked about profitably. There has been no indication whether Russia will send a delegation to the conference, but it is hoped one will attend even though Russia is not participating in the preparatory work.

It is also possible that the manner in which oil development is being administered and revenues therefrom used for the national benefit by the Venezuelan Government may be discussed in detail from the standpoint of the use of a wasting asset to develop other resources. Venezuela is considered as an experiment along this line, with the government using the revenues from oil production to develop other resources against the day when the importance of the petroleum reserves diminishes.

The conference will be purely scientific in character and will be designed to make available to all nations information regarding the best techniques, methods and equipment of each. It will not attempt to establish any policies and will have no authority to formulate recommendations for international agreements.

Beginning with a statement of the world's legacy of the depletion and misuse of resources, the plenary meetings will examine the contribution of improved techniques to the alleviation of shortages of mineral resources, fuel and energy, and food and forest products. A series of meetings will be devoted to the resource techniques of particular importance to the less developed countries. The plenary meetings will conclude with a review of the experience in various nations with projects based on the coordinated application of resource techniques.

First of English Pipe Shipments Arrives

HOUSTON.—The first of a series of shipments of English-made line pipe arrived at the Port of Houston early this week.

Approximately 11,000 ft. of 24-in. high-pressure pipe of 1½-in. wall thickness was aboard the SS Joseph Lykes on its arrival from Manchester. A total of 100,000 ft. of pipe will be imported over a period of about a year, according to J. B. Strauss, district manager of L. B. Foster Co.

The pipe will be used by various oil and gas companies in the southwest. The Foster company arranged for the manufacture and import of the English pipe. Strauss pointed out the shipments not only helped relieve the domestic pipe shortage but also gave England badly needed dollar exchange.

Commissions Offered to Petroleum, Gas Engineers

WASHINGTON. — Commissions in the Reserve Corps ranging from second lieutenant to colonel, are being offered by the Department of the Army to civilian experts experienced in any one of 76 broadly defined professional and technical specialties including geology and geophysics, and petroleum and natural-gas engineering.

The call for specialists is part of the program to build up an Army Reserve adequate to meet all requirements for the many special operations which experience in the last war showed are necessary to back up the fighting forces.

this week

INTERNATIONAL—International Cooperative Association arranges to import two cargoes of Iranian crude oil totaling 230,000 bbl. . . . ¶Arabian American Oil Co. leases English airfield for use as a training center for company personnel and as a maintenance base. . . . ¶Wildcat of Sinclair Panama Oil Corp. on Colon Island reported below 8,000 ft. . . . ¶Semiannual reports of Pantepec Oil Co., C.A., and affiliated Pancoastal Oil Co., C.A., lists current Venezuelan production at 34,300 bbl. daily. . . . ¶M. W. Kellogg Co. signs contract to build two refineries in Argentina. . . . Plants will have a combined capacity of 28,500 bbl. daily. . . . ¶Egyptian Government royalty for oil from Sudr field is set at 14 cents per barrel. . . . Current production there averaging about 8,000 bbl. per day. . . .

GOVERNMENT—President Truman stands firm on prediction that fuel shortage will plague East Coast next winter if weather is anything but mild. . . . OGD Director Max Ball describes outlook as considerably improved. . . . ¶Hope for validity of state-granted leases on offshore lands, even though Government may gain control, is voiced by B. A. Hardey, chairman of the Louisiana State Mineral Board. . . . ¶Senate committee launches survey of sales and distribution patterns of steel industry. . . . Study will take up oil pipe situation. . . .

INDUSTRY—October 14 set as "Oil Progress Day" when industry will report on its progress in communities throughout the nation. . . . ¶Stanolind Oil & Gas Co. cancels plans for synthetic plant near Garden City, Kans. . . . Mounting construction costs blamed by President E. F. Bullard. . . . Plans now being made which may permit reinstatement of project in 3 years, Bullard says. . . .

TRENDS—Unprecedented high production of United States crude oil continues. . . . Week ended August 23 marks the seventeenth all-time record high made this year. . . . Production averages 5,520,425 bbl. daily. . . . Wyoming sets new production record for year. . . . Averages 152,830 bbl. daily for week ended August 23. . . . ¶Stocks of four major products continue to climb. . . . Stocks for week ended August 14 showed gain of 2,621,000 bbl. over previous week. . . . During first 2 weeks in August runs to stills totaled 77,800,000 bbl. . . . In same 2 weeks stocks increased 5,750,000 bbl. or 7.4 per cent of total runs. . . . Over the past 6 weeks stocks of the four major products have increased 16,952,000 bbl. . . . This is an average of 403,600 bbl. daily. . . .

PIPE LINES—Tennessee Gas Transmission Co. shows rapid expansion. . . . Company has 10 spreads now operating in the field. . . . ¶La Gloria Corp. plans gathering lines in Waskom field in East Texas. . . . ¶Pipe-line companies report a 16 per cent gain in the oil movements over last year for second quarter of this year.

REFINING—Continental Oil Co. to begin immediate construction on Ponca City refinery. . . . Will increase production from 33,500 to 52,500 bbl. daily. . . . Major addition is a 30,000-bbl. crude topping unit. . . . ¶Humble's Baytown, Tex., refinery now averaging 250,000 bbl. daily. . . . Preliminary work is under way to add a 55,000-bbl. daily capacity pipe still there. . . . ¶United Refining Co. buys controlling interest of Healey Petroleum Corp. . . . Offers to purchase remaining shares outstanding. . . . ¶Shell Chemical Corp.'s new plant at Houston goes on stream. . . . ¶Electronic Chemical Corp. completes pilot plant at Mount Carmel, Ill. . . .

Leduc field's wild well, Atlantic 3, still was uncontrolled this week after initial efforts to complete two relief wells had failed. Relief well No. 1 was redrilling from 5,055 ft. after plugging back from 5,225 ft. Relief well No. 2 was redrilling from 3,700 ft. following a twist-off at that depth. The well had reached a depth of 5,222 ft. Ted Baugh, left, of the Department of Mines in Alberta, looks over the river of oil flowing from the wild well, which this week still was producing 8,000 to 9,000 bbl. of oil daily

OIT Announces Third-Quarter Quotas for Petroleum Exports

WASHINGTON. — Allocations by countries from the 14,575,000-bbl. third-quarter oil export quota was announced last week by the Office of International Trade.

Assignments to individual countries totaled 12,164,000 bbl., against 11,059,200 bbl. for the second quarter, when the total export quota was 13,949,000 bbl.; 623,000 bbl. was provided for special projects, against 382,000 bbl., and 1,788,000 bbl. was held as an undistributed reserve, against 2,507,800 bbl.

Total allocations to ECA countries and territories amounted to 7,330,000 bbl.

A breakdown of the allocations shows 2,021,000 bbl. of crude oil against 1,771,000 in the second quarter; 1,118,000 aviation gasoline against 1,091,700; 4,102,000 motor gasoline against 4,097,000; 396,000 kerosine against 326,000; 3,729,000 gas oil and distillate against 3,180,500; and 798,000 residual fuel oil against 593,000. Earmarked for special projects were 72,000 bbl. aviation gasoline against 70,000 in the second quarter; 15,000 motor gasoline against none; 28,000 kerosine against none; 145,000 gas oil and distillate against 32,000, and 363,000 residual fuel oil against 280,000.

The OIT explained that the quota for gas oil and distillate fuel for Curacao has been increased from 270,000 bbl. in the second quarter to 570,000 for the current period, the increase being necessary by the requirement of Curacao refineries for additional distillate to produce special fuel oil for the United States Navy.

Gander Airport in Newfoundland, which received no aviation gasoline during the second quarter, was given a quota of 130,000 bbl. because of the fact that supplies can be tankered in only during the summer and early autumn.

Several other increases were also made, especially in crude oil, to meet the essential needs of various countries, the OIT said, but most of the country quotas remain essentially the same as they were in the second quarter.

ECA Countries

Quotas for the ECA countries and territories were set up as follows:

Belgium and Luxembourg, 100,000 bbl. motor gasoline; 100,000 gas oil and distillate.

Denmark: 100,000 bbl. motor gasoline, 15,000 kerosine, 100,000 gas oil and distillate.

France: 1,000,000 bbl. crude oil, 200,000 aviation gasoline, 120,000 gas oil and distillate.

Greece: 120,000 bbl. motor gasoline, 20,000 kerosine, 120,000 gas oil and distillate.

Italy: 75,000 bbl. aviation gasoline.

Netherlands: 25,000 bbl. kerosine, 220,000 gas oil and distillate.

Norway: 20,000 bbl. motor gasoline, 20,000 kerosine, 74,000 gas oil and distillate.

Portugal: 15,000 bbl. aviation gasoline, 30,000 motor gasoline, 15,000 kerosine, 25,000 gas oil and distillate.

Sweden: 225,000 motor gasoline, 70,000 kerosine, 220,000 gas oil and distillate.

Switzerland: 50,000 bbl. motor gasoline, 5,000 kerosine, 60,000 gas oil and distillate, 30,000 residual fuel oil.

United Kingdom: 150,000 bbl. crude oil, 390,000 aviation gasoline, 1,400,000 motor gasoline, 13,000 kerosine, 1,100,000 gas oil and distillate.

British West Africa: 5,000 bbl. aviation gasoline, 40,000 motor gasoline, 15,000 kerosine, 64,000 gas oil and distillate.

Bermuda: 16,000 bbl. aviation gasoline.

French North Africa: 120,000 bbl. motor gasoline, 120,000 gas oil and distillate.

French West Africa: 15,000 bbl. aviation gasoline; 75,000 motor gasoline, 15,000 kerosine, 10,000 gas oil and distillate.

French Oceania: 12,000 bbl. motor gasoline, 3,000 kerosine, 15,000 gas oil and distillate, 8,000 residual fuel oil.

Curacao: 570,000 bbl. gas oil and distillate.

Non-ECA Countries

Allocations for non-ECA countries were as follows:

Argentina: 400,000 bbl. crude oil.

Bolivia: 6,000 bbl. gas oil and distillate.

Brazil: 10,000 bbl. aviation gasoline, 140,000 motor gasoline, 20,000 kerosine, 40,000 gas oil and distillate.

Chile: 90,000 bbl. residual fuel oil.

Costa Rica: 3,500 bbl. kerosine, 33,000 gas oil and distillate, 10,000 residual fuel oil.

Cuba: 450,000 bbl. crude oil, 35,000 aviation gasoline, 250,000 motor gasoline, 2,000 kerosine, 50,000 gas oil and distillate, 300,000 residual fuel oil.

Guatemala: 5,000 bbl. aviation gasoline, 10,000 motor gasoline, 2,500 kerosine, 5,000 gas oil and distillate.

Honduras: 1,000 bbl. kerosine.

Mexico: 21,000 bbl. crude oil, 15,000 aviation gasoline, 450,000 motor gasoline, 16,000 kerosine, 90,000 gas oil and distillate, 360,000 residual fuel oil.

Nicaragua: 15,000 bbl. gas oil and distillate.

Paraguay: 2,000 bbl. aviation gasoline.

Salvador: 20,000 bbl. motor gasoline, 2,000 kerosine, 7,000 gas oil and distillate.

Australia: 15,000 bbl. aviation gasoline, 220,000 motor gasoline, 45,000 kerosine, 220,000 gas oil and distillate.

Newfoundland: 130,000 bbl. aviation gasoline.

New Zealand: 10,000 bbl. aviation gasoline, 180,000 motor gasoline, 8,000 kerosine, 40,000 gas oil and distillate.

Union of South Africa: 20,000 bbl. motor gasoline, 5,000 gas oil and distillate.

China: 160,000 bbl. aviation gasoline, 300,000 motor gasoline, 50,000 kerosine, 150,000 gas oil and distillate.

Philippines: 20,000 bbl. aviation gasoline, 220,000 motor gasoline, 30,000 kerosine, 150,000 gas oil and distillate.

Refiners Ask Lifting of Export Controls

WASHINGTON.—A temporary glut of residual fuel oil has brought agitation for the lifting of export controls, but there is is little likelihood that any such step will be taken in view of the fact that the oversupply may be of short duration and residual again will be tight this winter.

Most companies, according to reports to Washington, have an oversupply of residual at the moment and, with the exception of the facilities of one East Coast company, storage capacity on the Gulf and East Coasts is filled.

The export quota for residual was increased from 1,263,000 bbl. for the second quarter to 1,450,000 bbl. for the current quarter, but OIT officials are not expected to take the ceiling off in view of the fact that domestic demand will begin to rise in October and it will be only a matter of weeks before inventories dwindle.

Joint S.A.E. Meeting Is Set for September 7-9

Thirteen technical papers will be presented at a joint meeting of the national tractor and diesel engine sections of the Society of Automotive Engineers to be held in the Hotel Schroeder, Milwaukee, September 7-9.

The papers will cover research in diesel engine combustion, fuel compositions, cylinder and ring wear, transmissions, and engines of higher efficiencies. It will be the first joint meeting of these two S.A.E. activities.

Engineers from abroad who will participate in the program include J. J. Broeze and C. Stillebroer, of the Delft laboratories of Royal Dutch Shell in the Netherlands. They will report on research in fuels for high-speed automotive and railroad diesel engines.

Co-Ops' Tax Position To Be 1949 Target

WASHINGTON. — A new drive to eliminate discriminatory tax advantages enjoyed by cooperative corporations will be launched when Congress opens its 1949 session next January.

The basis of the effort may be legislation prepared by Senator John A. Williams of Delaware, which would tax presently exempt cooperatives on all income except patronage dividends paid in cash and restrict their operations to selling or buying for members only. Other provisions of the bill would tax nonexempt cooperatives, and those which do not restrict operations to their own members, on all income, including that paid out as patronage dividends, and make all cooperatives taxable on accumulated profits the same as corporations.

Williams pointed out that between 1939 and 1947, cooperative business increased from $4,000,000,000 to more than $14,000,000,000, and predicted that by 1950, unless checked, it will reach $20,000,000,000. These coperatives, he said, pay little or nothing in taxes, whereas private enterprise pays 38 per cent on profits. Over 60 per cent of the cooperatives' business is done by 7 per cent of the organizations, he charged.

Activities Reviewed

Reviewing the activities of some of the most important cooperatives, Williams cited two that have been active in the oil field.

In 1939, he said, the Consumers Cooperative Association, Inc., of North Kansas City, Mo., organized a subsidiary, the Cooperative Refinery Association, at Phillipsburg, Kans., to build and operate an oil refinery with a rated capacity of 3,400 bbl. daily. In 1942 it purchased the 1,500-bbl. refinery of Terry Carpenter, Inc., at a cost of $700,000, and in 1943 acquired a 13,500-bbl. refinery at Coffeyville, Kans., from the National Refinery Co. for $4,000,000. In the same year the cooperative joined with four others in organizing the National Cooperative Refinery Association with an authorized capital of $2,010,000, which purchased the 17,500-bbl. refinery of the Globe Oil & Refining Co. at an estimated cost of $5,000,000, including a 229-mile pipe line from McPherson, Kans., to Council Bluffs, Iowa.

In a suit asking dissolution of the cooperative, charging violation of the state marketing and security laws, the Kansas Attorney General asserted this "farmers'" association had extended its operations to international trade, exporting 3,000,000 gal. of motor oil to 10 foreign countries in 1946.

GEORGE H. WEBER

D. H. STORMONT

Weber Named Journal Refining Editor

EFFECTIVE immediately George H. Weber, a member of The Oil and Gas Journal's editorial staff since 1934, has been appointed refining editor with headquarters at the Journal's eastern offices, 415 Lexington Avenue, New York City.

Weber joined the staff following graduation from the Petroleum Engineering School of the University of Oklahoma where he majored in petroleum refining. He has served the Journal in various editorial capacities. In addition to his initial work at the Tulsa headquarters, Weber has been in charge of the Journal offices at San Antonio, Houston, Shreveport, and Dallas.

Starting in the summer of 1941, Weber joined the Army as a reserve officer and had more than 4 years active service. For 3½ years he was in the Pacific area including Fiji, New Hebrides, Solomon Islands and finally in Philippine Islands campaign. He rose from the rank of first lieutenant to major in the field artillery.

Following his discharge from the service in late 1945 Weber was placed in charge of the Dallas area office of the Journal. He has written many articles dealing with developments in petroleum refining. Previously he made a special study of cycling and associated operations and his series of articles published in the Journal was widely commented on at the time and are now a permanent part of literature having to do with this major development in petroleum operations.

Weber will be located at the New York offices about September 15.

Stormont Succeeds Weber

Weber will be succeeded in the Dallas area by D. H. Stormont, who has been an associate editor of the Journal with headquarters in Tulsa since he returned from the service in 1946.

Stormont is also a graduate of University of Oklahoma of the class of 1934, receiving the degree of bachelor of science in chemistry, specializing in petroleum refining engineering. He was employed by Barnsdall Refining Co. for a time and joined the Journal editorial staff in 1935.

After doing special writing and editing, he was placed in charge of the Fort Worth office and was located there from 1938 to 1942 except for a brief service in the Tulsa office. His field work at that time extended from New Mexico to Arkansas and North Louisiana, and he is widely known by operators throughout that area. He recently completed a 2-month field trip to the oil fields and plants in Venezuela, Trinidad, and Dutch West Indies.

Stormont entered the service in 1942 as a reserve officer. He saw combat duty in France, Germany, and Austria as a captain with the artillery section of the 71st Infantry Division.

World Fuel Situation Again to Be Studied

WASHINGTON. — Another "comprehensive survey" of the world fuel situation will be launched in October by a Senate subcommittee on natural resources headed by Sen. George W. Malone of Nevada.

Malone plans a 3-day hearing October 5-7, the results of which will be embodied in a reference work which it is hoped will save the time of congressional committees in considering legislation relating to fuels.

Crude From Guarico Area of Venezuela Now Reaching World Markets

by D. H. Stormont

This is another in a series of articles on Venezuela by the author, who returned recently after spending 2 months gathering information on oil operations in that country.

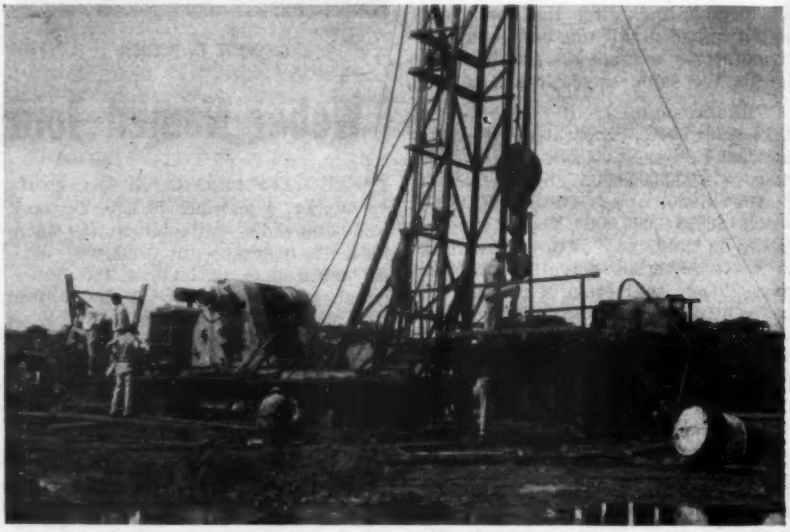
FIRST oil from the state of Guarico, central Venezuela, recently began moving toward world markets following the completion of a 157-mile pipe line from Las Mercedes field to the Caribbean Coast.

This oil movement climaxed 10 years of exploration and development over an area of 175 miles long and 81 miles wide. It involved the drilling of 178 wells for a total footage of more than 880,000 ft. For the several oil companies taking part, it came only after the expenditure of well over $100,000,000.

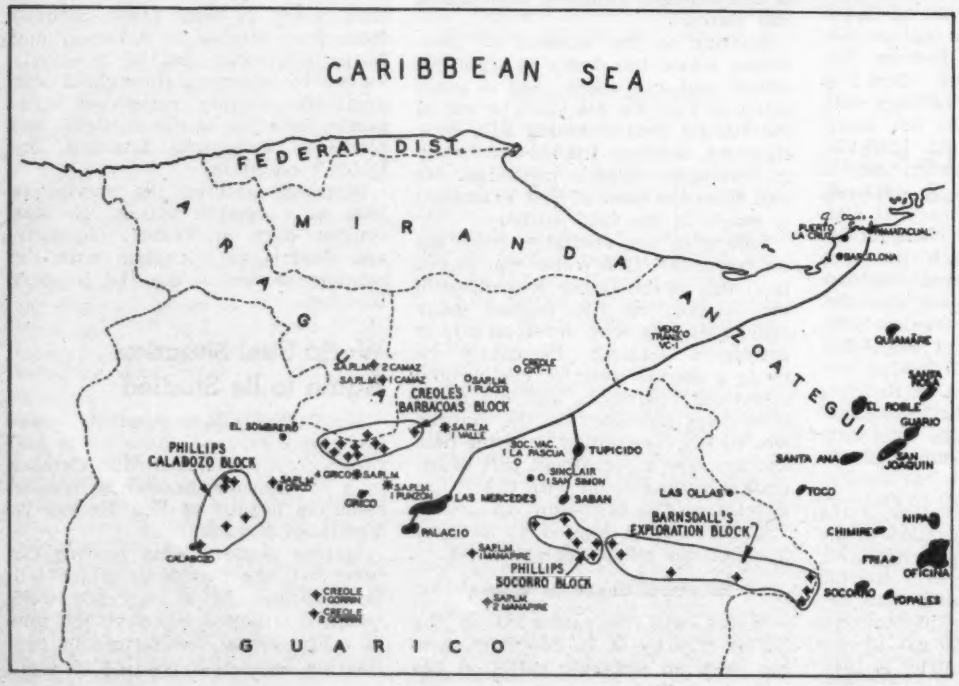
When the pipe-line outlet was completed the Mercedes area had 83 producing oil wells so that initial shipments were in the neighborhood of 10,000 bbl. daily. By the end of this year the throughput will be somewhat larger as 16 rigs are now busy developing added oil reserves in the three fields which the pipe line will serve. Since the line has a daily capacity of 60,000 to 65,000 bbl., ample capacity is available.

International

The new 16-in. pipe line was built by S.A.P. Las Mercedes, a jointly owned company of Texas Petroleum Co. and Caracas Petroleum, S.A. Built to provide the needed outlet for Las Mercedes and Palacio fields in central Guarico, the line also will serve the nearby Tucupido field of Venezuelan Atlantic Refining Co. And, as soon as a 20-mile feeder line is completed, the trunk carrier also will provide an outlet for Atlantic's Sa-



Work-over rig reconditioning a well in the Las Mercedes field. Some wells were shut in for 3 or 4 years before the field finally was given an outlet 2 months ago



Exploration activity in the State of Guarico has been at a high level for the past 2 years. Deep tests drilled to date, current wildcats, and blocks that have proven unproductive so far are shown in the map at left. Also shown is route of the new Mercedes-Pamatacual pipe line

TABLE 1—SUMMARY OF WELLS DRILLED IN GUARICO BETWEEN 1939 AND JULY 1, 1948

Company—	Year										Results				Wells drlg.
	39	40	41	42	43	44	45	46	47	48	Oil	Gas	Abd.	Ttl.	July 1
Barnsdall S. Am. Corp.	0	0	0	0	0	0	0	6	1	0	0	0	7	7	0
Caracas Pet., S. A.	1	0	0	0	0	0	0	0	1	0	0	0	2	2	0
Creole Pet. Corp.	0	1	0	1	0	0	0	4	6	0	1	4	7	12	1
Guarico Oil Fields, Ltd.	0	2	0	0	0	0	0	0	0	0	0	0	2	2	0
Mene Grande Oil Co.	0	1	0	0	0	1	0	0	0	0	0	0	2	2	0
Phillips Oil Co.	0	0	0	0	0	0	0	0	8	2	0	0	10	10	0
S.A.P. Las Mercedes	0	0	2	1	4	2	14	24	60	30	83	18	36	137	10
Sinclair Oil Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Socony-Vacuum Oil Co., S.A.	3	0	0	0	0	1	0	0	0	1	0	0	5	5	1
Ven. Atlantic Ref. Co.	0	0	0	0	0	0	0	1	3	4	5	1	2	8	7
Total	4	4	2	2	4	4	14	35	79	35	89	23	73	185	20

TABLE 2—DATA ON OIL DISCOVERIES IN THE GUARICO REGION, JULY 1, 1948

Field and company—	Year discovered	Discovery well	Depth, ft.	Oil wells	Gas wells	Abd. wells	Drilling wells
Las Ollas, Creole*	1941	1 Ollas	7,947	1	0	0	0
Las Mercedes, S.A.P.L.M.	1941	2 Merced.	5,586	59	14	20	5
Palacio, S.A.P.L.M.	1946	33 Merced.	4,593	24	0	5	4
Grico, S.A.P.L.M.	1946	1 Grico	5,036	1	0	0	0
Tucupido, Atlantic	1947	1 Tuc.	6,858	3	1	1	3
Saban, Atlantic	1947	2-1A Saban	5,474	2	0	1	4

*Inactive; gas-condensate producer.

ban area to the south of Tucupido (see accompanying map).

Construction of the 157-mile line, which terminates at Pamatacual near Puerto La Cruz, was started last December and completed early in May. Also involved were the construction of an initial pumping station in the northern portion of Mercedes field and a marine loading terminal at Pamatacual. These were completed early in June so that the first oil shipment was started through the line about June 15. Pumping facilities consist of two 800-hp. gas engines driving, through speed increasers, three-stage centrifugal pumps. Other features of this line were described on these pages in the January 8, 1948, issue of The Oil and Gas Journal

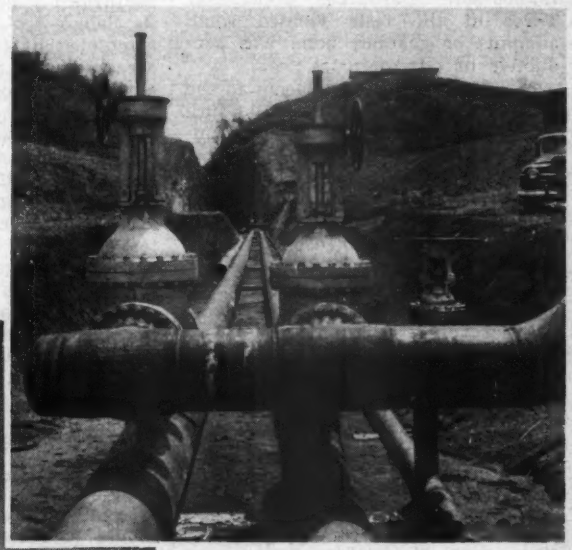
Development of Guarico

The Las Mercedes company by far has been the most active operator in Guarico. As shown in Table 1, the company has drilled 137 wells in the state since its formation in 1940. Currently the company has nine rigs at work in the Las Mercedes and Palacio area. North of there some 40 miles the company, jointly with Venezuelan Atlantic, also is drilling below 8,200 ft. at its 1 Placer, according to most recent field reports.

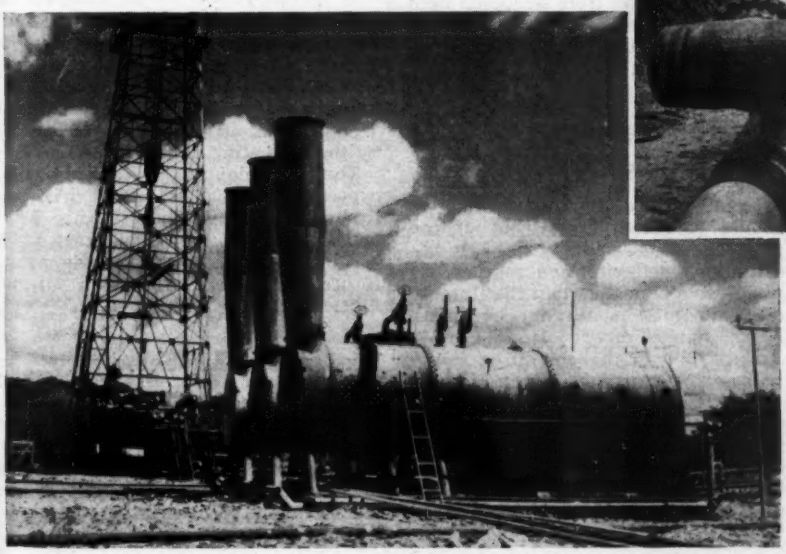
Including stepouts from proven oil areas, the company has drilled a total of 32 wildcats in Guarico. Of these tests, three have been oil discoveries; namely, Las Mercedes, Palacio, and Grico. Only the Mercedes and Palacio fields, with 59 and 24 producers, respectively, have been under development. At the Grico area only the discovery well, a gas-oil producer, has been drilled. Other pertinent data relative to Guarico oil fields are shown in Table 2. (Both Tables 1 and 2 are based on data presented by K. S. Fricke in the August 1948 issue of Petroleo Interamericano).

Most of the Mercedes company's exploratory activities has been conducted in the vicinity of its Las Mercedes or "Chain Lots" field. There its wholly owned exploitation concessions total 834,000 acres. The company, however, also has widespread holdings throughout northern Guarico.

Out of the original 320,000-acre exploration concession in the Punzon-Grico area to the west of Las Mercedes, S.A.P.L.M. has retained 162,000 acres on an exploitation basis. Practically the whole of the western part of its Grico acreage was abandoned following the drilling of nine



Manifold for the tanker loading line at S.A.P. Las Mercedes' new terminal at Pamatacual, near Puerto La Cruz. A 135-ft. cut was made through the ridge in the background in order to accomplish better gravity loading



One of nine drilling rigs being used by S.A.P. Las Mercedes in developing the Chain Lots and Palacio areas at Las Mercedes. The company had completed 83 oil producers in the 4,100-4,300-ft. pay before the field was placed on production

4,200-5,300-ft. tests on this block. A considerable portion of middle Grico acreage was retained, while in the eastern half the maximum acreage permissible under Venezuelan law (50 per cent) was held. Locations for a series of tests on the Punzon block have been selected but drilling is being delayed until rigs can be spared from the Mercedes development.

In the Comaz-Placer area 40 miles north of Mercedes, where the 1 Placer is being drilled, S.A.P.L.M. and Atlantic have exploitation parcels totaling 77,000 acres. Exploration concessions of 353,000 acres were originally held by the companies. Most of this acreage was dropped, however, following the negative results yielded by 1 and 2 Camaz, both 9,000-ft. tests, drilled in 1946 and 1947. The acreage retained as exploitation parcels was largely in the southeastern portion, where 1 Placer is drilling.

In the vicinity of Carrizol, in northeastern Guarico, Creole Petroleum Corp. conducted an intensive exploration program for 3 years prior to 1948. At the first of this year, after drilling 10 tests to 5,500-7,000 ft., and spending $19,300,000, the company reliquished all but 25 per cent of its 793,000-acre Barbacoas concession. Three of the tests yielded small amounts of gas but none was productive of oil.

In eastern Guarico, adjacent to the Anzoategui state line, Barnsdall South American Oil Corp. likewise was unsuccessful in discovering oil during 1946 and early 1947. The company drilled seven 4,400-5,300-ft. stratigraphic tests, all of which were nonproductive. Phillips Oil Co. (formerly Phillips Venezuelan Oil Co.) likewise has been unsuccessful in developing oil production at its Calabozo block, where seven stratigraphic tests were drilled, and in drilling two wells on its Socorro concession.

From this brief account of major exploration activities in Guarico, it is readily seen that wildcatting for the most part has yielded only negative results. The search for oil, however, is continuing unabated. In addition to the Mercedes 1 Placer, three other deep tests were under way during July (see map). These were Socony-Vacuum 1 La Pascua, drilling below 6,527 ft.; Creole GXT-1 at Tamanaco, below 7,180 ft.; and Sinclair Oil & Refining Co. 1 San Simon, drilling at 7,145 ft. Also during July three geophysical and two structural-drill parties were working in Guarico.

Field Developments

In Mercedes or Chain Lots field, the Mercedes company has completed 59 oil wells and 14 gas wells in seven different sands at 4,100 to 4,400 ft. Because of high gas-oil ratios some 10 wells are closed in pending remedial work to shut off the gas zones. In the Palacio area south of Chain Lots the company now has 24 wells producing from three horizons in the La Pascua sand, encountered slightly higher than in the northern area.

To assure maximum economical recovery of oil, the company plans to get pressure-maintenance operations under way about the first of the year. At the beginning, experimental operations will be started in two blocks, some 2,500,000 cu. ft. of gas being returned daily at injection pressures of 1,750 to 1,800 psi. Two-stage compression totaling 750 hp. will be employed in the pilot operation.

Although a relatively late-comer, Venezuelan Atlantic Refining Co. has been very successful in its Guarico drilling operations. Drilling on a Pantepec Oil Co. concession, Atlantic's first test in Guarico was completed as an oil producer in December 1946. The test, discovery well for the Tucupido field, was completed at 6,858 ft. total depth for an initial production of 410 bbl. daily. Subsequent drilling has resulted in the completion of four more oil producers, one gas well, and one failure. Three rigs currently are being used in the field.

Shortly after completion of its Tucupido discovery, Atlantic moved southward some 20 miles and started its Saban 2-1A. Again the company completed its first wildcat in a new area as an oil producer, this time at a total depth of 5,474 ft. for an initial production of 308 bbl. daily. One other oil producer has been completed in this deeper pay. The company also is attempting to develop a 900-ft. pay recently discovered while attempting to make a water well of a test that failed in the deep pay. Four rigs are engaged in developing the 5,500-ft. pay.

Shipment of oil from Tucupido field is expected to begin in September. The five producing wells have a capacity of about 3,300 bbl. daily.

Failure Forecast for New Brazilian Oil Bill

Even if the Brazilian Congress should pass the latest draft of the petroleum bill—a highly unlikely assumption, well-informed sources explain—it is almost certain that foreign oil companies would not be interested. Latest reports from Rio de Janeiro indicate that the bill probably will not be passed at this session.

The bill stipulates, in its present form, that national needs must have first call on all oil produced and that 60 per cent interest in refining and transport will have to be reserved for the Brazilian Government. Both of these stipulations undoubtedly will fail to find favor with outside oil interests.

Egyptian Government Sets Royalty for Sudr Field

A royalty of approximately 14 cents per barrel will be paid to the Egyptian Government from crude oil produced at the Sudr oil field which was discovered in 1946, according to a dispatch from Cairo.

No other details were released, but it is believed that this royalty clause is part of the projected Sudr concession-lease to Anglo-Egyptian Oilfields, Ltd. The Sudr operation is a joint project of Anglo-Egyptian (Shell) and Socony-Vacuum Oil Co., Inc. *(The Oil and Gas Journal, May 20, page 125).*

Current daily production at Sudr is between 7,500 and 8,000 bbl. This output comes from nine wells. An additional well is being drilled. At Asl, 10 miles south of Sudr, on the Sinai Peninsula, Anglo-Egyptian and Socony-Vacuum are getting about 200 bbl. daily from a single well. Additional drilling is being carried out here also in an effort to define the field.

Survey May Be Run on British Guiana Concession

Hunting Aero Surveys, Ltd., of London, may run a survey of a 1,200-sq. mile oil concession in the section of British Guiana which adjoins Venezuela, according to a report from Georgetown, British Guiana.

George Adams, South American director for Hunting, recently opened negotiations with R. C. Humphrey, a British Guiana industrialist who holds the oil concession.

Y.P.F.-Kellogg Contract Signed for Two Plants

Yacimientos Petroliferos Fiscales has signed a contract with M. W. Kellogg Co. for the construction of two complete refineries, according to a government source in Buenos Aires. The contract is subject to approval by the Argentine administration.

The new plants, with a combined capacity of 28,500 bbl. daily, will be located at San Lorenzo (Santa Fe) and Lujan de Cuyo (Mendoza).

Y.P.F. may seek bids in the near future for the construction of a lubricating plant.

Ration Cut Expected

Australia may be forced to cut its gasoline ration due to shortage of dollars, according to a radio report from Sydney. Political disturbances in the Middle East may also be a factor in the proposed gasoline reduction.

Pantepec Producing 34,300 Bbl. Daily From Venezuelan Fields

VENEZUELAN holdings of Pantepec Oil Co., C.A., are now producing at a daily rate of approximately 34,300 bbl., according to semiannual reports of Pantepec and its affiliate Pancoastal Oil Co., C.A.

Pantepec holds a one-half interest in the following Eastern Venezuela concessions, the other half being held by Creole Petroleum Corp.:

Mulata field, comprising some 32,000 acres, with more than 200 wells producing around 24,000 bbl. daily.

Roble field, with approximately 36,500 acres, with 17 wells producing an average of 6,000 bbl. daily.

The deep test well, 15 Roble, which is 2½ miles to the east of the center of the field, was drilled to 11,850 ft. to test the Merecure formation which heretofore had never been penetrated in this field. Judging from the cores, highly porous saturated sands in the Merecure have been penetrated. Moreover, producing sands at shallower levels were found elsewhere in the field. This well—which has created considerable interest in oil circles—is now being tested.

Pancoastal holds a one-half interest in some 320,000 acres of concessions in Eastern Venezuela, the other half being held by Atlantic Refining Co. Included in these acres are:

Tucupido Has Five Wells

The Tucupido concession, consisting of about 37,000 acres, on which there are now five producing wells from which over 3,300 bbl. of 40°-gravity oil per day are being run to collecting tanks. This oil has been sold to Atlantic for $2.95 per barrel, less pipe line, storage, and loading charges and will be marketed in early September through the recently completed Texas Co. pipe line. Atlantic has three rigs in constant operation in this field and expects current and future wells in between 30 and 40 days.

The Pelayo concession, consisting of approximately 14,000 acres, now has two wells capable of producing slightly over 1,000 bbl. daily with another well drilling. Atlantic plans to build a short pipe line to connect this field to the Leona terminal of the Gulf Oil Corp. pipe line.

Tools have just been moved in to drill an offset test well to determine the extent of the reservoir which yielded oil from 1 Socororo on the Socororo concession, located 20 miles west of the extensive and highly productive Oficina field. Socororo No. 1 was completed in May 1940 with an initial production of 644 bbl. daily but experienced mechanical difficulties during completion and sanded up not long afterward. Lacking a pipeline outlet, it was not worked over.

Wildcat in Panama Now Below 8,000 Ft.

Sinclair Panama Oil Corp.'s initial wildcat on Colon Island off Bocas del Toro, Panama, is now down to approximately 8,000 ft. Air reconnaissance work is being carried on elsewhere over portions of the company's 18,000,000-acre concession. Additional exploratory work is being carried on by hand crews.

Earl A. Trager, formerly chief geologist for Skelly Oil Co., recently arrived in Panama where he is a consulting geologist for the Sinclair Panama company.

Meanwhile in Colombia, the Cia. Unidas de Petroleo, S.A., is drilling its second wildcat on the San Andres concession and is down to around 1,500 ft. The first test, which was abandoned earlier this year, was drilled to approximately 6,900 ft.

Cia. Unidas is owned by Sinclair Oil Corp., Richfield Oil Corp., and Cities Service Co. Sinclair Panama is owned by Cities Service and Sinclair, the latter holding its interest through the affiliated Venezuelan Petroleum Co.

Report Shows Soviet Oil Production Exceeding Plan

Soviet oil production is increasing even more rapidly than contemplated under the state plan for 1948, according to a report of the U.S.S.R. State Planning Commission for the second quarter.

The report shows that the oil industry of the eastern areas exceeded its second quarter goal by 10 per cent and in the southern and western areas by 7 per cent, but since no volume figures have ever been disclosed for either basic production or the projected target, the actual output of the Russian oil industry is successfully concealed.

The commission claimed also that the production of all major commodities topped their quotas for the second quarter, oil by 15 per cent, gasoline by 16 per cent, kerosine by 17 per cent, and natural gas by 9 per cent.

International

Cooperative Buying Oil From Middle East

Two cargoes of Iranian crude oil, or approximately 230,000 bbl., will be imported into the United States by the International Cooperative Association this year, according to Lloyd R. Marchant, general manager of I.C.P.A. Both cargoes will be loaded at Abadan. The crude oil will be purchased from Anglo-Iranian Oil Co., Ltd.

Importation of Middle East crude oil by the co-ops will be somewhat of a milestone as heretofore the co-ops have been furnishing finished petroleum products to various countries overseas, as well as conducting normal domestic operations.

Last year the I.C.P.A. was vigorously urging control of all Middle East oil by the United Nations. And while these relatively small purchases of Middle East crude have been made, indications are that the I.C.P.A. stand has not altered.

Aramco Leases Airfield For Training Center

The Suffolk County Army Airfield, near Westhampton, Long Island, has been leased by Arabian American Oil Co. for use as a training center and maintenance base.

The oil company will use 26 barracks and other buildings as a training school for employes preparing to leave for Saudi Arabia. The property was subleased from the National Aircraft Maintenance Corp., which will service the company's planes. Facilities include three long runways, capable of handling large planes.

The company's training program for employes, which will be in operation by October 1, will include intensive courses in the language, customs of Saudi Arabia, and the technical and administrative practices of company operation.

ECA Authorizes Oil Products for Greece

The Economic Cooperation Administration announced over the weekend that it has authorizations for the procurement by Greece through the Navy Department of $458,300 worth of motor gasoline, diesel oil, and light fuel oil from Saudi Arabia, and by France of $398,000 worth of petroleum coke from this country.

An authorization in the amount of $748,000 also was issued to the Netherlands for the procurement of petroleum products in the United States.

Hallanan Names Members of Two Advisory Committees on Allocation

WASHINGTON. — Membership of two of the advisory regional committees which will operate under the voluntary allocation agreement was announced over the weekend by Walter S. Hallanan, chairman of the National Petroleum Council, following approval of his appointments by the Oil and Gas Division.

With only a few changes, the personnel of the committees will be the same as the groups set up last winter to handle the temporary agreement through which the industry tested the efficacy of the voluntary arrangements provided for in Public Law 395.

John W. Newton, vice president of Magnolia Petroleum Corp., Beaumont, Tex., was named chairman of the committee for District III; B. L. Majewski, vice president of Deep Rock Oil Corp., Chicago, chairman of the District II committee, and B. I. Graves, vice president of Tide Water Associated Oil Co., New York, chairman of the District I committee.

Under the provisions of the agreement approved this month by Atty.-Gen. Tom C. Clark and Interior Secretary J. A. Krug, the Oil and Gas Division is to pass on all appointments to committees and subcommittees. Late last week the OGD approved the membership of the committees for Districts I and II.

Names Announced

Those named as members of the committee for District I, in addition to Chairman Graves, are as follows: vice chairman, M. J. Rathbone, Esso Standard Oil Co., New York; secretary, W. H. Midwinter, Socony-Vacuum Oil Co., Inc., New York; counsel, Miles W. Newby, Jr., The Texas Co., New York; F. G. Bannerot, Jr., Elk Refining Co., Charleston, W. Va.; Robert M. Bartlett, Gulf Oil Corp., Pittsburgh; John P. Birmingham, White Fuel Corp., Boston; John Dressler, N. J. Gasoline Retailers Association, Hackensack, N. J.; J. E. Dyer, Sinclair Refining Co., New York; J. B. Fisher, Kendall Refining Co., Bradford, Pa.; J. Parks Gwaltney, National Oil Jobbers Council, Durham, N. C.; Harry B. Hilts, Empire State Petroleum Association, Inc., New York; Walter Hochuli, The Texas Co., New York; D. B. Hodges, Shell Oil Co., Inc., New York; W. E. Huston, Republic Oil Refining Co., Pittsburgh; Wiley L. Moore, Wofford Oil Co., Atlanta, Ga.; A. L. Nickerson, Socony-Vacuum Oil Co., Inc., New York; J. C. Richdale, Esso Standard Oil Co., Boston; John W. Scott, Buckley & Scott Utilities, Inc., Watertown, Mass.; D. J. Smith, Pan American Petroleum & Transport Co., New York; H. B. Van Cleve, Maritime Petroleum Corp., New York; and B. S. Watson, Cities Service Co., New York.

In addition to Chairman Majewski those named to the District II committee are as follows: Vice chairman, Harry J. Kennedy, Continental Oil Co., Ponca City, Okla.; counsel and secretary, John D. King, Cities Service Oil Co., Chicago; assistant counsel and assistant secretary, L. P. Craig, Deep Rock Oil Corp., Chicago; H. T. Ashton, Socony-Vacuum Oil Co., Inc., St. Louis; S. C. Bartlett, The Texas Co., Chicago; Reid Brazell, Leonard Refineries, Inc., Alma, Mich.; L. S. Corbin, Standard Oil Co. (Ky.), Louisville; J. Fenner Cummins, Tennessee Oil Men's Association, Nashville; D. M. Dickey, Northwest Petroleum Association, Wayzata, Minn.; Louis M. Faber, Retail Gasoline Dealers Association, Milwaukee; Charles Z. Hardwick, The Ohio Oil Co., Findlay; A. M. Hughes, Phillips Petroleum Co., Bartlesville, Okla.; Carl R. Jonswold, Arrow Petroleum Co., Forest Park, Ill.; Paul R. Kempf, Staebler-Kempf Oil Co., Ann Arbor, Mich.; Jess Knowles, Skelly Oil Co., Kansas City; P. E. Lakin, Shell Oil Co., Inc., New York; J. Howard Marshall, Ashland Oil & Refining Co., Ashland, Ky.; R. W. McDowell, Mid-Continent Petroleum Corp., Tulsa; R. H. McElroy, The Pure Oil Co., Chicago; Brown L. Meece, Globe Oil & Refining Co., Chicago; W. H. Merritt, Cities Service Oil Co., Chicago; E. W. Miles, Standard Oil Co. (Ind.), Chicago; George N. Olson, Chicago; Rankin P. Peck, National Congress of Petroleum Retailers, Inc., Detroit; A. L. Stallings, Indiana Farm Bureau Cooperative Association, Indianapolis; A. A. Stamgaugh, Standard Oil Co. (Ohio), Cleveland; W. W. Vandeveer, Cleveland; E. V. Weber, Petroleum Industry Public Relations Committee, Cincinnati; and Russel S. Williams, Individually Branded Petroleum Association, Indianapolis.

Baytown Refinery Making Record Runs; New Still and Laboratory to Be Added

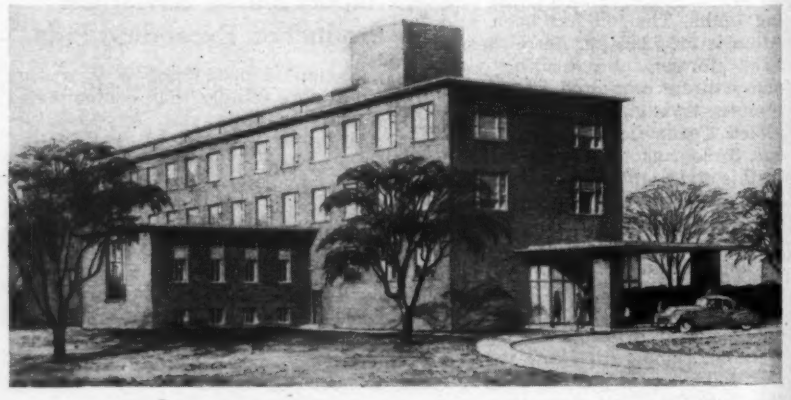
HOUSTON.—Humble Oil & Refining Co.'s Baytown, Tex., refinery is now averaging approximately 250,000 bbl. daily, though it recently set a single-day throughput record of 293,700 bbl.

Rated capacity of the Baytown refinery is 200,000 bbl. daily with cracking facilities of 140,000 bbl. daily. Humble as well as many other refiners throughout the country is now operating at considerably above capacity in an effort to satisfy record product demand.

The single-day record of 293,700 bbl. was set earlier this summer. Humble has pressed into service at Baytown old thermal cracking equipment, and it was explained that the record throughput was made possible by optimum operation of practically every facility at the plant.

Sustained operation at this rate would not be possible. Aside from maintenance requirements and other equipment limitations, products storage at the plant is not sufficient to handle the output of such a throughput. Daily charge varies from 230,000 to 275,000 bbl. to average 250,000 bbl. daily.

Preliminary work is now under way for the construction by Foster Wheeler Corp. of a 55,000-bbl. daily capacity pipe still at Baytown. This is expected to be completed early next year. It will not add substantially to the capacity of the refinery since it will largely replace older equipment to come out of service.



This architect's sketch shows the new research laboratory which Humble Oil & Refining Co. will build at its Baytown, Tex., refinery. The three-story brick structure will contain about 62,000 sq. ft. of floor space and will accommodate approximately 115 scientists and research workers. It will be located in the southwest part of the refinery area adjacent to the building housing pilot plants. Knutson Construction Co. last week received a contract from Humble for construction of the new laboratory. Humble also recently let a contract to H. K. Ferguson Co. to build a major addition to the mechanical shop at Baytown

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WASHINGTON WATCHING

BY BERTRAM F. LINZ

Matter of Bookkeeping

WASHINGTON.—President Truman recently reported that the Government would be in the red to the extent of $1,500,000,000 by the end of the fiscal year next June, but whether there is a deficit or a surplus will depend upon the manner in which the bookkeeping reflects the transfer from 1948 funds of $3,000,000,000 to be spent on European recovery during the current fiscal year and the treatment accorded by Congress to supplemental appropriations in excess of $3,500,000,000 which the President said he would ask next session.

In the financing of the Economic Cooperation Administration last spring, Congress ordered that $3,000,000,000 of 1948 revenues be transferred to pay initial 1949 expenditures toward European recovery. It also provided that the $5,300,000,000 provided for foreign aid should be stretched over a period of 15 months, but authorized the President to spend it in 12 months, which he is doing. This will necessitate a supplemental appropriation of $1,500,000, which Truman said he would request next year.

Also included in the anticipated supplemental appropriations, but with no detailed information although most of it is believed to be earmarked for power-project operations, is $79,000,000 for "natural resources not primarily agricultural."

In addition, the President's balance sheet showed $2,100,000,000 in contract authorizations, which may or may not be paid off within the year.

What is actually done with the more than $8,600,000,000 in this "twilight zone" and whether revenues are more or less than now anticipated will be the real factors determining whether there will be a surplus or a deficit next June 30. Until then, the political masterminds will pit their guesses against each other.

Royalty Oil Sales

THE Interior Department is expected shortly to suspend its present method of offering government royalty oil for sale to the highest bidder in cases where independent refineries without adequate sources of crude are seeking the oil, and to allot such oil at the market price to refiners showing the greatest need.

Under the O'Mahoney Act, the department is required to give preference to small independent refiners in selling royalty oil, and there has been considerable criticism of its policy of "auctioning" the oil off to the bidder offering the highest bonus above the market price which, it was contended, served to penalize the refiners most in need of the oil.

Attempts were made to deal with the problem by new regulations, but it is understood there was some feeling in department circles that such action might develop unsuspected difficulties, and it is now probable that it will be handled by a suspension of the present regulations where small refiners express a desire to secure oil offered by the department. Where no such desire is expressed, the oil will be offered, as in the past, to the highest bidder.

Two-Way Dilemma

NOTHING less than a united, wholehearted effort on the part of the Marshall plan nations will put them on their economic feet by 1952, as contemplated under the European recovery program.

That is the considered opinion of two labor advisers to the Economic Cooperation Administration, just returned from a first-hand study of the European situation.

To accomplish what the United States proposes to do, western Europe will have to raise its industrial production by as much as 45 per cent in the next 4 years. Unaided, this might be done in something over 10 years, but the Marshall plan countries are working under the threat of "a time factor, a hunger factor, and a fear factor skillfully cultivated by the communists," the labor advisers reported.

The evidence is clear, however, that only by unstinted cooperation can Europe achieve the objective laid down for it. No country in Europe is self-contained as to raw materials; but there are enough basic raw materials in the several countries as a group if the proper rearrangements can be made to move them across boundaries.

Norway, for instance, has rich iron-ore deposits and unexploited manganese, but the mining machinery was destroyed by the Nazis and the miners are still idle. The same country also has great potential electrical power, which could be used to relieve European coal shortage, but again no equipment. Able to procure needed machinery from other countries, Norway's mineral and power production, in turn, could help them.

Much the same is true in other fields. Countries with raw materials are without the equipment to work them; countries with the equipment are handicapped in getting raw materials.

Clock Turned Back

THE Democratic National Committee has turned the clock back 27 years to revive old scandals which, somehow, are designed to prove something of political importance.

Emulating the famous smear campaign which paved the way for the election of President Roosevelt in 1932, a party campaign newspaper last week rehashed the notorious Teapot dome deals, complete with a picture of the teapot-shaped rock formation which gave the reservation its name.

Under the heading "Do You Remember," which will be the keynote for one phase of the campaign, the committee pictured a smoke-filled suite in the Vanderbilt Hotel in New York in November 1921, at which "big oil men" plotted to sell 33,000,000 bbl. of oil to "a mysterious Continental Trading Co." at 25 cents a barrel above the market.

Out of the "kitty" thus accumulated, it was charged, much of the deficit of the Republicans' 1920 campaign was liquidated, and funds were made available to swing the Teapot Dome lease.

None of the details of the Teapot Dome scandal was overlooked, and the same treatment was accorded the Elk Hills lease. But it was admitted the oil deals were not nearly as offensive as some of the other scandals of the era.

Why the replaying of old records? The committee answers that, too, with the implication that only Democrats are honest.

"History has a perverse way of repeating itself."

Gratuitous Proposal

NO action is expected to be taken by the State Department on a recent recommendation in a budget bureau study that the petroleum division be made a part of the International Resources Division, but a complete reorganization of the department is expected to be considered early next year which may affect the oil offices headed by Robert H. S. Eakens.

The budget bureau suggestion was made in a report on a survey of a controversy between the State and Commerce departments over duplication of effort in the field of international trade.

State officials said the proposal was "gratuitous," had no connection

with the subject under consideration and was not supported by any evidence in the body of the report. Accordingly, they decided to ignore it, which will match a similar decision by Commerce officials with respect to a recommendation that fewer and better personnel should be secured for the Bureau of Foreign and Domestic Commerce.

Reorganizations of the State Department come regularly every 2 or 3 years, generally in the form of switching various functions into new combinations designed to meet current international conditions more effectively. Studies are now going on, and it is expected some changes will be made next year, if the Democrats remain in power, while if the Republicans win the November elections a very real shakedown will occur.

Scattered Refineries

THE National Security Resources Board is making a study of the vulnerability of the oil industry to enemy attack and is expected to come up in the near future with some suggestions for the dispersion of refineries and storage facilities.

The board's thinking is premised on the expectation that the next war will open with a surprise attack—the effectiveness of which was demonstrated by the Japanese at Pearl Harbor—designed to destroy or immobilize the industries most vital to national defense, among the most important being oil refineries and storage facilities and synthetic-rubber plants.

The destruction of oil plants would be particularly advantageous to an enemy, it is pointed out, not only because it would interfere with the supply of commodities most vitally needed for military operations but also because the explosions or fires which would follow would endanger any other vital resources in the area. Enemy attacks would be directed at those points where they would pay off in greatest damage.

Three possible safeguards have been suggested, only one of which, however, is seen as economically feasible. Underground installations, which would probably provide maximum protection, are not considered practical for application on a large scale, nor is the use of fire, blast, or radiation-resistant materials in aboveground facilities. Only the dispersion of plants is within the realm of practicability, and even here the board does not suggest that industry pick up and relocate its present plants but only that it consider protection in selecting sites for new ones in the future.

The best location for plants would appear to be in areas where the industry concentration covers less than 5 sq. miles or with a population of less than 50,000, separated by about 10 miles of relatively open country or by hills. Mere distance from an enemy, in itself, is no longer an assurance of protection, and even an isolated location would be no safeguard in the case of industries of the highest military value.

The best protection, then, might lie in relatively small units located in relatively small communities, with few vital industries operating in the same area. But experts consulted by the board agree that economic factors which differ for each industry, must be taken into consideration in developing any program for protection against bombing. The principal factors listed are location of raw materials, labor, sites, industrial fuel, transportation facilities, market, distribution facilities, power, water, living conditions, laws and regulations, and tax structure.

Some industries probably cannot be effectively dispersed, but over the period of a few years it is believed the risk might be spread simply by careful location of new plants and new equipment, on which it is estimated $12 to $14 billions are being spent annually.

Hearing Scheduled on Steel for Tanker Repair

WASHINGTON.—The Office of Industry Cooperation will hold public hearings August 31 on two proposed voluntary plans for allocation of steel products, one covering the allocation of 40,380 tons monthly for the 4 months ending next February 28 for the production and repair of oil tankers.

The tanker program calls for the provision monthly of 29,285 tons of plates over ⅜ in., 3,340 tons of plates ⅜ in. and less, 6,400 tons of shapes, 165 tons of sheets, and 1,190 tons of pipe.

The steel is to go to builders and repairers of oil tankers, and it is expected some objections will be raised at the hearings by representatives of operating companies which do their own maintenance and repair work and fear they will not be included in the program.

Texas Crude Production Increased During June

AUSTIN.—Texas crude-oil production during June averaged 2,462,028 bbl. daily, an increase of 13,290 bbl. daily over the preceding month, according to the Railroad Commission's latest monthly report on crude production and removal from leases.

Allowables for the 2 months were 2,691,402 bbl. daily for June and 2,673,002 bbl. daily for May. Total indicated production in Texas in June, including both reported production and the allowables of leases not reported, was 73,860,855 bbl. against 75,910,752 bbl. in May.

Percentage underproduction in the state showed a slight rise from 8.39 per cent in May to 8.52 per cent in June. Underproduction in June ranged from 22.27 per cent for District 9 in North Texas, which includes considerable stripper-well production, down to 3.43 per cent in District 6 which embraces part of East Texas.

Stanolind Gulf Coast Officials Hold Meeting

HOUSTON. — Approximately 120 supervisory employes comprising the top management in Stanolind Oil & Gas Co.'s Gulf Coast division met here August 18-19 for a special conference devoted to discussion of employe and public-relations trends and policies.

The conference was conducted under the supervision of R. E. Nelson, Jr., Gulf Coast division manager in the Houston division headquarters. It was the last of a series of such conferences previously held at other company division offices in Fort Worth, Oklahoma City, and Casper, Wyo.

Principal speaker was W. A. Strong, Midwest executive for Opinion Research Corp., who gave an illustrated lecture on industry trends in employe and public relations. Purpose of the conference was to inform Stanolind's management on employe and public relations and discuss ways in which these relations can be improved. At the meeting in Houston were officials representing all four Gulf Coast districts and from exploration, production, geophysical, industrial-relations, manufacturing, and marine departments.

Embargo Holding Up Spectrometer Shipment

WASHINGTON. — An embargo on the exportation of any instrument or equipment which might be adaptable for use in connection with atomic energy is holding up the shipment to many foreign refineries of mass spectrometers, the cheapest, safest, and most efficient instrument for checking the quality of refinery product, it was learned this week.

Although it is understood a number of applications for authority to export instruments have been filed, the test case appears to be that of Asiatic Petroleum Corp., which is seeking to ship one to its refinery in Holland.

Under the Atomic Energy Act, the exportation of material, equipment, or instruments usable for atomic energy purposes is controlled by the AEC. That agency is exercising every precaution to prevent such things from falling into the hands of foreign interests.

PERSONALS

Elliott Is Elected President of Sohio

S. H. ELLIOTT, vice president of Sohio Pipe Line Co. and who 10 years ago was purchasing agent for Standard Oil Co. (Ohio) before he entered pipe-line operations, has been elected president of Sohio Pipe Line Co.

A graduate of the University of Kansas in civil engineering in 1924, Elliott worked for several years in designing and construction of bridges in Kansas and New Mexico and later studied for 2 years at the School of Business Administration, Harvard University.

His first and only job in the oil industry has been with Standard Oil Co. (Ohio), where he started in the business research department in 1929. Later he went into the sales department where he was concerned with the development of sales of nonpetroleum products before he spent 4 years as the company purchasing agent.

In 1938 Elliott was placed in charge of the operations of the company's pipe lines as manager of the department. Prior to his recent promotion he was vice president of the parent company in charge of transportation.

At the time of Elliott's promotion announcement was also made of the advancement of Charles E. Spahr, formerly general assistant to Elliott, to vice president of Sohio Pipe Line Co.

Ed Riddell, Middle East supervisor of United Geophysical Co., an affiliate of Hoover, Curtice & Ruby, recently returned to Beyrouth after a short business trip to the United States.

Three new district office managers for Sun Oil Co. recently appointed include: **William F. Hinze,** Brownsville, Pa.; **Max L. Dufeny,** Atlantic City, N. J.; and **C. Wilbur Shelly,** Baltimore, Md.

Recent transfers in the mechanical department of the Bayonne, Baltimore, and Bayway refineries of Esso Standard Oil Co. include: **Ralph B. Weidman,** Bayonne mechanical supervisor, has been assigned to the Baltimore refinery on a loan basis as mechanical superintendent; **Edward J. Tierney,** Bayway maintenance engineer, has been assigned on a loan basis to take over Weidman's duties; **Charles H. Degener,** regional engineer for Bayway, has been moved to maintenance engineer; and **John E. Grady,** assistant regional engineer for Bayway, has been moved to the east side area in the same capacity.

M. F. BRAECKEL

Marc F. Braeckel, vice president and general sales manager of Richfield Oil Corp. of New York, has been elected president to succeed **W. Chalmers Burns,** who is retiring. Braeckel joined Richfield in 1930. Previously he had been associated with Richfield Oil Co. of California and other oil companies.

Dr. Harold A. Beatty, formerly technical assistant to the general manager, has been appointed to the newly created position of assistant director of research at the research laboratories of Ethyl Corp. in Detroit. He will assist **John B. Macauley,** director of research. Dr. Beatty has been succeeded by **Dr. O. Edward Kurt,** formerly manager of the development section at the company's antiknock compound manufacturing plant in Baton Rouge, La.

Lieut. Comdr. Sherman A. Wengerd, U. S. N. R., assistant professor of geology at the University of New Mexico, has returned to active duty for a 2-week training period in the Trimetrogon compilation section, U. S. Geological Survey, Denver, Colo., where he will work on maps of the U. S. Naval Petroleum Reserve No. 4 in Alaska.

Charles L. Schneider, formerly an engineer for Virginia Gas & Oil Co., Charleston, W. Va., has joined Pure Oil Co. as assistant production engineer in the company's southwestern producing division at Tulsa.

J. ROY AUERS

J. L. COULSON

J. Roy Auers has been named manager of the recently created North Texas division of Warren Oil Corp. Auers has been associated with Warren since the purchase by Warren of the Hanlon properties. Auers, previously an independent operator, had been in charge of the Hanlon Wichita Falls offices. Other appointments to the new division include: **Jack L. Coulson,** assistant to **Jack Dunn,** division production superintendent; **A. J. Evans,** division drilling superintendent; **J. W. Modrall,** drilling engineer; **J. P. Hamman,** division engineer; and **D. R. Ward,** material man. **Sherman Fehl** has been promoted to district superintendent in charge of operations in the company's Graham, Tex., district.

Elgin G. Diedrick, recently graduated from the University of Kansas, has joined the geological staff of Amerada's district office at San Antonio.

Alexander Melamid, associated with Raffinarie Belge de Petroles, S.A., Antwerp, Belgium, and Melanol Corp. of New York, spent the latter part of July and the early part of August on a combination business and vacation tour of the southwestern region of the United States, for the purpose of observing the market and economic possibilities of this part of the country. Besides his business duties, Melamid lectures on economics at the School for Social Research in New York.

A. S. Dawson, assistant development commissioner for the Canadian Pacific Railway at Montreal, has been appointed geologist for the company with headquarters in Calgary.

Gordon Duke, an executive of Southeastern Oil, Inc., and Southeastern de Mexico, last week left for Europe where he will visit France,

the American zone in Germany, Belgium, Italy, Spain and Holland. Duke's companies sell petroleum and petroleum products to various concerns in these countries.

James D. Smullen, assistant Texas state attorney-general in charge of oil and gas cases, has resigned and joined a law firm in Houston.

Hal G. Sehnert, geologist for Sun Oil Co. at Oklahoma City, has resigned to join Sohio Petroleum Co. at Evansville, Ind.

Edward G. Voss has been elected assistant treasurer of Arabian American Oil Co. Voss, who will make his headquarters in San Francisco, joined Standard Oil Co. of New Jersey in 1934 as an office boy. Twelve years later he was made head of the company's investment and finance division.

J. H. Sembower, formerly regional manager for Shell Oil Co., Inc.'s personnel and industrial relations department in Houston and now on an extended leave of absence, has been named executive director of the International Road Federation with headquarters in London.

Ray David Cunningham has been appointed manager of the protective coatings department, sales division, of Lion Oil Co., it was announced recently by **T. M. Martin,** president. Martin at the same time reported that the company would construct a $250,000 plant at El Dorado, Ark., devoted exclusively to the manufacture of protective coatings. The new plant is to be completed by December this year. Cunningham, who recently was director of sales for Nox-Rust Chemical Corp. of Chicago, was for 10 years manager of the rust preventive and protective coating department of Kendall Refining Co., Bradford, Pa.

T. C. HOKE

Thad C. Hoke, manager of the land and geological departments for British-American Oil Producing Co., Tulsa, has been appointed vice president in charge of exploration. Soon after graduating from the University of Chicago in geology in 1927, Hoke joined Indian Territory Illuminating Co. and did scouting, surface and geophysical work in Kansas, Oklahoma, and Texas. He became superintendent of the geological department and held that position until 1941 when he joined Fain-Porter Drilling Co. as geologist. In 1944 he joined British-American as district geologist in Oklahoma City, later becoming chief geologist. He was named manager of the land and geological departments last year.

O. I. TORKELSON

J. E. MATTER

O. I. Torkelsen, production manager for the western division for British-American, was appointed vice president in charge of that division. After graduating from the University of California, Los Angeles, in geology, Torkelsen joined Reiber Geophysical Co. Two years later he became a consulting geologist with offices in Los Angeles. In 1939 he joined British-American as a geologist. In 1945 he became production manager for the western division.

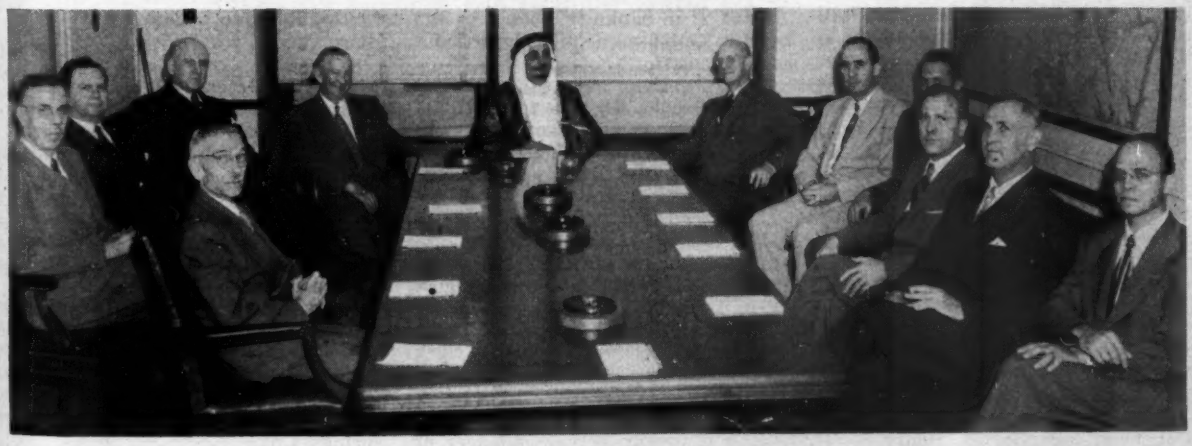
J. E. Matter, chief geologist of the western division for British-American, has been named vice president in charge of exploration of the western division. Prior to joining British-American, Matter was with Shell Oil Co., Inc., at San Antonio, Tex. He became chief geologist for British-American in 1945.

James A. Rehler, formerly in charge of the land department for Shell Oil Co., Inc.'s, North Texas division at Wichita Falls, has resigned to join Amerada Petroleum Corp. as district landman for Amerada in San Antonio where the company has opened new land offices. Rehler has been succeeded by **Vernon S. Roberts,** formerly in Shell's Oklahoma City land department.

George Sonntag, assistant chief dispatcher in the pipe-line department for General Petroleum Corp., has been named assistant to the manager of the department.

Fern Fuson has been named head of the new division of Ashland Oil & Refining Co. with offices at Shreveport, La., to cover Louisiana, Arkansas, and East Texas.

Arthur F. Busch, assistant division manager in charge of operations at Cincinnati for Standard Oil Co. (Ohio), has been named manager of the Ma-



Gulf Oil Corp.'s Vice President Charles W. Hamilton and other Gulf officials conferred with Izaat Jaafar, aide-de-camp to the Sheikh of Kuwait, last week in New York. Gulf and Anglo-Iranian Oil Co., Ltd., jointly own Kuwait Oil Co., Ltd. Shown above, left to right, are: A. P. Portas, B. F. Hake, C. C. Richmond, L. Stanley Kelley, H. E. Slater, Kuwait's aide-de-camp, Hamilton, J. F. Harrison, A. Pyre, S. V. Gasperina, C. A. Baird and R. E. Westling. Kelley, not a Gulf man, is field director of the American University at Cairo

PERSONALS

rion division to succeed **J. P. Sharkey,** who was recently made manager of the Columbus sales division.

J. P. MALOTT

James P. Malott has been promoted from region petroleum engineer with Continental Oil Co. to assistant manager of the Houston region of the company's production and drilling department. **Edwin A. Austin,** former district petroleum engineer at Basile, La., succeeds Malott as petroleum engineer at Houston. Malott has been with Continental since 1935. He is a graduate of Colorado School of Mines.

T. M. Welton, who last year joined the market research department in San Francisco, Calif., for Oronite Chemical Co., a subsidiary of Standard Oil Co. of California, has been appointed central district manager of the company's product development department with headquarters in Chicago.

Thomas Beament, controller for Basin Oil Co., Los Angeles, has been elected vice president.

R. G. Bandy, formerly with Stanolind Oil Purchasing Co., Tulsa, has joined Midland Cooperative Wholesale, Minneapolis, Minn., and will be in charge of that company's new oil division offices in Tulsa. He will have charge of oil procurement, crude-oil handling, and land and exploration.

James Boyd, director of the Bureau of Mines, and **Don Carroll,** associate director of the Oil and Gas Division, have left for London where they will represent the Interior Department at the International Geological Congress which opened there August 25. It is the first session of the Congress since it met at Moscow in 1937.

Jack A. Morgan, of Norman, Okla., has joined Sun Oil Co. as junior petroleum engineer at Kilgore, Tex., as a trainee.

SHIFTS—

J. R. Ramirez, engineer, Standard Oil Co. (Ind.), Santa Ana to Atherton, Calif.; **Eduardo Sarmiento,** engineer, Richmond Petroleum Co. of California, Richmond, Calif., to Bogota, Colombia; **Schuyler B. Henry,** geologist, Arabian American Oil Co., San Francisco, Calif., to Saudi Arabia; **Robert J. Torrens,** engineer, Chinese Petroleum Corp., San Pedro to Long Beach, Calif.; **H. V. Copeland, Jr.,** geologists, Magnolia Petroleum Co., Roswell, N. M., to Lake Charles, La.

Henry Greenfield, Jr., geologist, Continental Oil Co., Smithville to Gonzales, Tex.; **R. C. Rowe,** engineer, Carbide & Carbon Chemicals Corp., Galveston, Tex., to Charleston, W. Va.; **Bruce Foster,** superintendent, M. W. Kellogg Co., Goose Creek, Tex., to Tulsa; **J. C. Martin, Jr.,** geologist, Bay Petroleum Co., Houston, Tex., to Denver, Colo.; **Albert L. Ballou,** foreman, Seismograph Service Corp., Laredo to Beeville, Tex.

John Cuvelier, superintendent, Rowan Drilling Co., Midland to Big Spring, Tex.; **Richard Williams,** geologist, Geophysical Corp., Palestine, Tex., to Tulsa; **Walter F. G. Stein,** engineer, San Antonio to Pampa, Tex.; **O. E. Mechem,** engineer, Delta Drilling Co., Tyler, Tex., to Denver, Colo.; **G. Frederick Shepherd,** geologist, General American Oil Co. of Texas, New Orleans, La., to Dallas, Tex.

E. J. Bruce, superintendent, Wheless Drilling Co., Ruston to Vivian, La.; **Robert H. Cross,** geologist, Creole Petroleum Corp., Baton Rouge, La., to Caracas, Venezuela; **Walter Randall,** geologist, Atlantic Refining Co., Beatrice to Grove Hill, Ala.; **B. M. Bradley,** engineer, Carter Oil Co., Carmi to St. Elmo, Ill.

Leo Ford, superintendent, Trumbull Asphalt Co., Chicago, Ill., to Dearborn, Mich.; **M. E. Shaw,** engineer, Crossville, Ill., to Evansville, Ind.; **Ralph G. Hubman,** geologist, The Texas Co., Mount Pleasant, Mich., to Denver, Colo.; **Ralph E. Hammond,** engineer, Carter Oil Co., St. Elmo to Mattoon, Ill.; **Roland C. Nyquist,** engineer, Shell Oil Co., Inc., Wood River to Edwardsville, Ill.; **M. M. Mulholland,** geologist, Carter Oil Co., Hydeville, Vt., to Mattoon, Ill.

Charles C. Frye, engineer, Continental Oil Co., Denver, Colo., to Ponca City, Okla.; **Cloyd A. Ring,** engineer, C. A. Ring et al, Martins Ferry, Ohio, to Roswell, N. M.; **J. R. Gilliland,** foreman, General Geophysical Co., Bridgeport, Neb., to Buffalo, Wyo.; **William S. McCready,** engineer, Phillips Petroleum Co., Anadarko to Ardmore, Okla.; **R. W. French,** engineer, Standard Oil Co. of Ohio, Oklahoma City to Cleveland, Ohio; **W. M. Schul,** engineer, Phillips Petroleum Co., Oklahoma City to Great Falls, Mont.; **L. T. Haugen,** engineer, Stanolind Oil & Gas Co., Tulsa to Houston, Tex.

DEATHS

M. A. Davey, Sr., 73, pioneer Texas independent oil operator, died August 19 in Palestine, Tex. He participated in the development at Sour Lake, Spindletop, and Batson fields and is credited with preliminary work which led to the discovery of oil in the Boggy Creek area of East Texas.

Ernest W. Terry, 47, a veteran of 30 years with Gulf Oil Corp., died August 21 in Seminole, Okla. He had been in Gulf's production department at Seminole for 17 years.

L. A. Brauer, 64, superintendent of Gulf Oil Corp.'s pipe-line department and who had been with the company for 31 years, died August 19 in Houston.

W. T. Denard, 65, retired pump-station engineer for Gulf Oil Corp., in its pipe-line division, died August 19 in Lufkin, Tex.

Robert C. Holmes, Sr., 57, a clerk for The Texas Co. for 29 years, died August 17 in Houston.

J. B. Edwards, retired manager of manufacturing for Socony-Vacuum Oil Co., Inc.'s, White Star division and who directed the building of the company's present refinery at Trenton, Mich., died August 11 in Detroit, Mich.

H. L. Jolly, 70, independent oil operator in the Oklahoma, Illinois, and Indiana areas, died August 15 in Princeton, Ind.

Willard F. Hird, 62, manager of marketing activities for the Ponca City division for Continental Oil Co., Ponca City, Okla., died August 20 in Ponca City.

Harry H. Breene, 79, retired independent oil operator of Oklahoma and at one time state oil inspector, died August 23, in Tulsa.

Earl Phoenix, 59, driller, died August 12 in Coleman, Tex.

Joshua Rodney Reichard, 60, drilling superintendent for Deep Rock Oil Corp., died August 15 in Hutchinson, Kans.

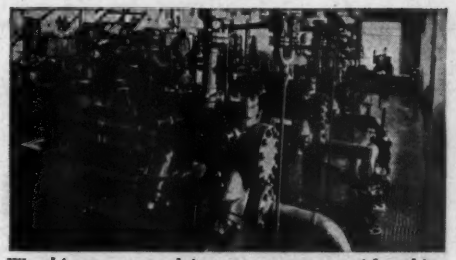
William W. Nichols, 87, former vice president of Allis-Chalmers Manufacturing Co., died August 13 in Colorado Springs, Colo.

I. W. Townes, about 60, tool dresser, died August 16 in Siloam Springs, Ark.

It Takes a Lot of Worthington Equipment to "Dry Out" Gas

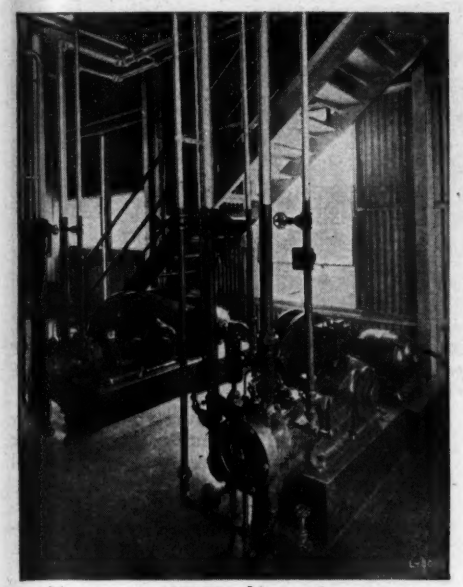
These pictures show some of the Worthington equipment installed in The Chicago Corporation's Feazel & Kinsey gasoline plant located at Carthage, Texas, designed and built by Stearns-Roger Manufacturing Co. of Denver.

The purpose of this plant is to take the wet high-pressure gas produced from the high-pressure gas wells in the Panola County fields, and separate the water vapor from the recoverable hydrocarbon vapors consisting primarily of propane, butane, and gasoline. The residue dry gas leaving the absorbers is delivered to the pipe line for transmission and distribution.



Worthington steam driven process pumps, with turbine-driven centrifugal high pressure lean oil pumps in background

Worthington type OXP single stage steam-driven gas compressor used as vapor recompressor



Two 5 x 5 type HB Worthington Compressors supplying air to instruments

Two Worthington six-stage centrifugal pumps which supply absorption oil to the high-pressure absorbers at a discharge pressure of 1300 psi maximum. Each pump is driven by a 875 hp Worthington Multi-stage condensing steam turbine

Keeps Pressure on Oil Sands— Saves By-Passing Not-Needed Water

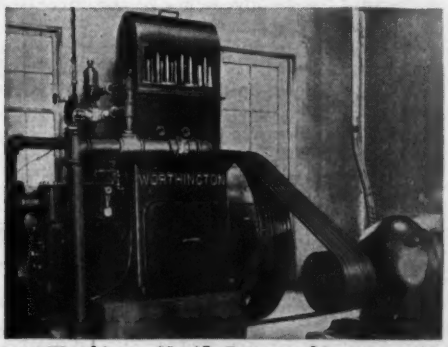
As you know, it is highly detrimental to permit variable pressure on oil sands. Any material reduction in pressure results in loss of oil production which may never be recovered.

On the Lawton Oil Company lease near Bradford, Pa., a Worthington Automatic Variflo (variable capacity) Power Pump is used for repressuring oil sands by water, and was selected for the purpose because it automatically compensates for withdrawals for other uses.

Water is taken from the discharge line between pump and input water well for house use, drilling operations, etc. The Variflo pump with its pressure governor automatically compensates for these variable withdrawals and maintains constant pressure on the oil sands.

The pump operates at 240 rpm with 500 psi discharge pressure.

The Variflo pump eliminates the necessity of by-passing high pressure water not required as the capacity pumped is automatically adjusted to the requirements of the system. By-passing liquid is inherently inefficient and the horsepower that would be wasted through by-passing is saved by using the Variflo pump, and in addition the efficiency of the Variflo pump remains high throughout its full capacity range.



2 x 4 Worthington Variflo Pump used in repressuring oil sands by water

NEWS

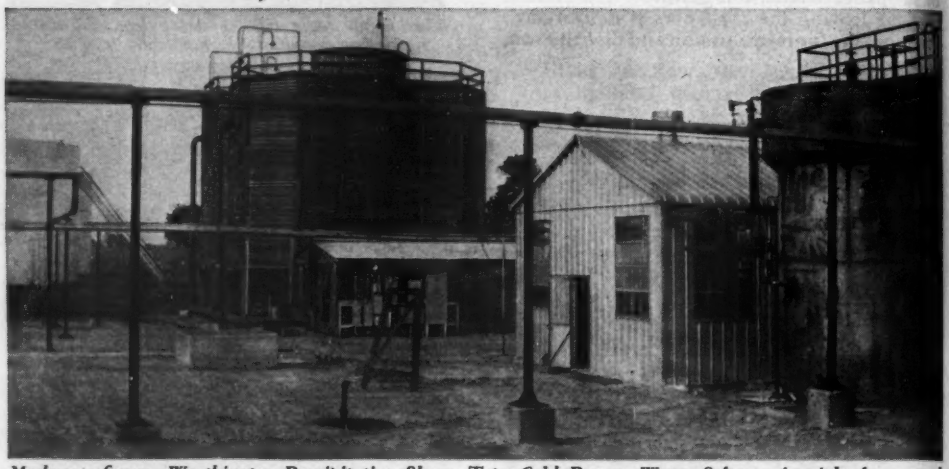
FROM THE PETROLEUM FRONT

AS REPORTED BY THE DEVELOPMENT ENGINEERS, FIELD SERVICE REPRESENTATIVES AND CUSTOMERS OF WORTHINGTON

NEWS

from the petroleum front

Worthington Water Softener Eliminates Scale and Corrosion



Modern refinery—Worthington Precipitating Slurry Type Cold Process Water Softener in right foreground; cooling towers in background

Scale and corrosion are prevented in the cooling water system of modern refineries by Worthington's exclusively-designed Precipitating Slurry Type Cold Process Water Softener. Continuous delivery of uniformly soft, stabilized, clear water is assured.

In this Worthington Water Softener, maintenance of the softener slurry bed is entirely accomplished by the scientific use of hydraulic energy provided by the pressure of the general raw water supply system.

This eliminates moving agitating parts formerly thought necessary for mixing the applied chemicals with pre-formed precipitate.

New Gas Compressors for Philadelphia Electric Co.

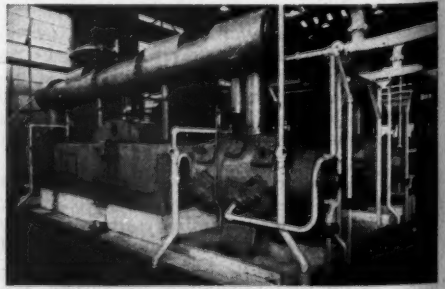
Demands for gas heat, for both industrial and residential use, have skyrocketed during recent years in Philadelphia. With the war's end, plans for enlargement of Philadelphia Electric Company's Chester gas plant were put into effect.

The excellent performance records of Worthington equipment—such as the 1400 hp horizontal twin-tandem two-stage gas engine compressors — suggested consultation with Worthington engineers, which led to the selection of more Worthington equipment to handle the requirements of the increased service load.

A 1750 hp motor-driven gas compressor was installed and has been in operation two years. A duplicate unit, for additional requirements, has been installed this year. Driven by synchronous motor, it is capable of delivering 520,000 cu ft of free gas per hour against a discharge pressure of 100 psi into the distributing system of gas mains.

Since the gas supply to this unit is being furnished from large steel gas holders, it was necessary that special precautions be taken, in the construction of this compressor, to minimize gas pulsations in the suction gas holder. As the result of special design of the gas cylinders, pulsation has been virtually eliminated even when operating at partial capacity.

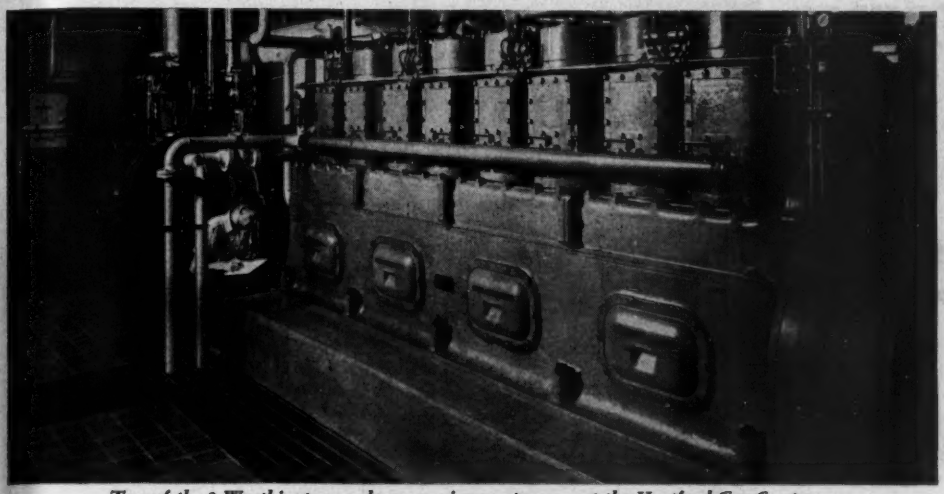
2 Worthington 1750 hp motor driven gas compressors



Close up of one of the compressors. Capacity is 520,000 cu ft of free gas per hour against a discharge pressure of 100 psi

petroleum NEWS

Worthington Pump and Machinery Corporation • Harrison, N.



Two of the 3 Worthington angle gas engine compressors at the Hartford Gas Company

One of New England's Finest Compressor Installations

The Hartford Gas Company, which celebrates its 100th Anniversary this year, supplies modern gas service to 63,000 customers in metropolitan Hartford and Manchester.

The Company purchases about two-thirds of its send out gas from coke ovens at New Haven and manufactures the rest as water gas in Hartford.

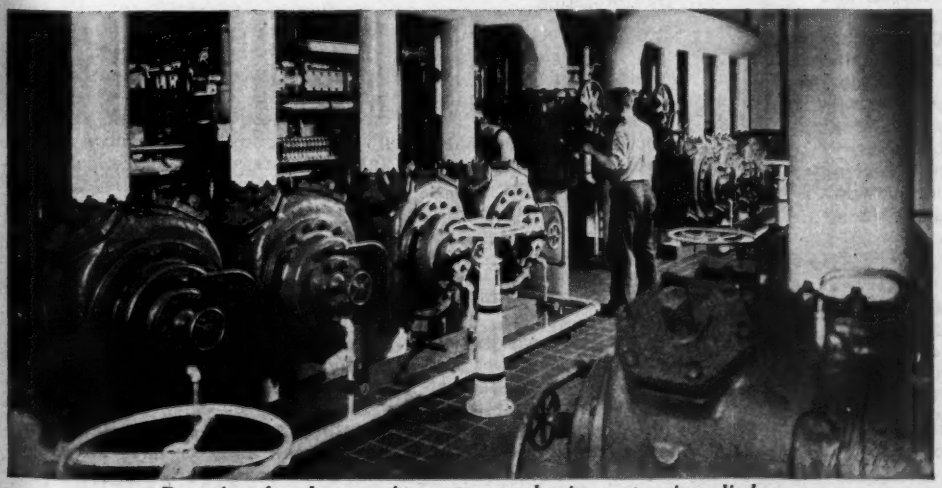
With a constant increase in gas sales, more and more of the send out has to be pumped through an intermediate pressure system.

To do the job, three Worthington LFC-8 angle engine compressors, each with eight power cylinders and four compression cylinders and each displacing 4653 cfm of a mixture of coke oven and water gas (equivalent to 225,600 cfh free gas capacity), are used.

This equipment is designed for operation normally at 25 lb gauge and, by a system of clearance pockets, to 50 lb for handling pipe line to Manchester, Connecticut in an emergency.

The photographs show why this installation has become a center of attraction for persons interested in gas distribution.

Interestingly, the coke oven gas brought from New Haven, some 35 miles away, is pumped by three other large Worthington compressors which have been in continuous service for 20 years.



Rear view of angle gas engine compressors showing compression cylinders

Discovery of OIL STRUCTURES by Aerial Photo

by Bernard M. Bench*

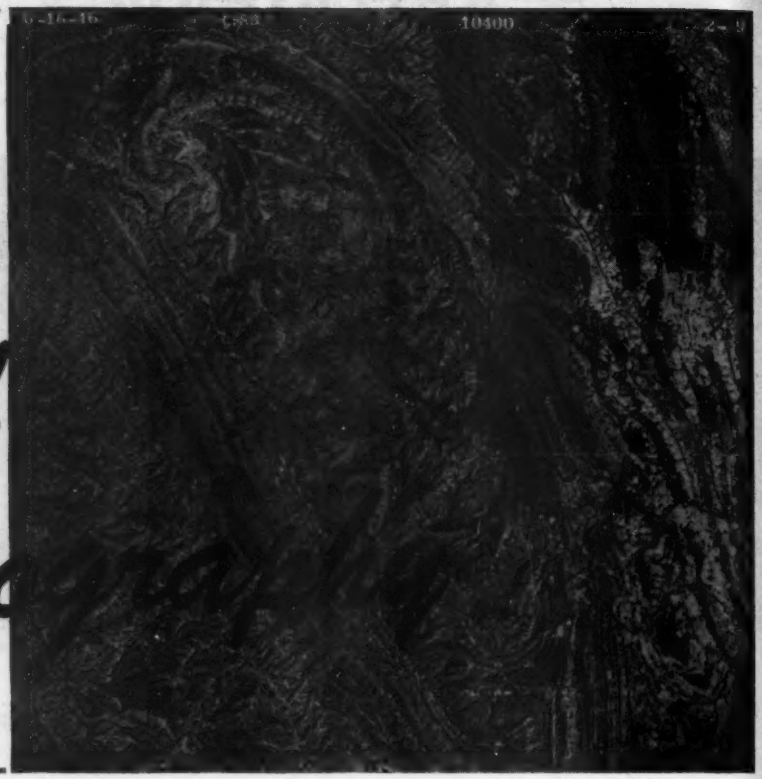


Fig. 1—Vertical aerial photograph of the central portion of the Elk basin structure, Montana. This structure has a surface closure of several thousand feet and the parallel bands of sedimentary rock can be seen dipping away on the flanks. (Photo courtesy Fairchild Aerial Surveys, Inc.)

IN the Rocky Mountain region and elsewhere in the world where rock exposures occur at the surface, aerial photographs are providing an extensive panorama for assistance in the location of oil structures. Mountainous and inaccessible areas with their abundant surface rocks, and even the broad basins with scanty outcrops, reveal to the eye of the aerial camera, geology heretofore unknown.

This bird's-eye view perception of depth and the third-dimensional picture of structural features on the surface is obtained by scanning vertical aerial photographs through the stereoscope (Fig. 1). The terrain features rise in exaggerated relief and the dips of anticlinal and synclinal folds stand out clearly. Outcrops, faults, formation contacts, scarp traces, and topographic expressions usually appear in prominence and the distribution of the rocks and soils and the multitude of land forms are visible in surprising clarity. Elevation data laboriously obtained by field work are no longer essential to picture a structural condition. Beds curving about the end of an anticline or strata ending at a fault plane are seen almost at a glance.

Dips and strikes, formation bands and contacts, faults, and other geologic features can be traced and plotted. Broad trends of anticlinal and synclinal structures that are obscure on the ground can often be recognized with ease. Areas of friable rock with few exposures, frequently contain residual soils that define the arrangement of underlying beds by distinct color shades and tones or changes in vegetation.

Geologic features overlooked in ground exploration are often detected in photographs because the stereoscope permits inspection of outcropping ledges on opposite sides of a ridge or of steep canyon walls. Correlations can be carried into inaccessible places without concern as to rough terrain, adverse weather, or the time element.

Interpretation

Geology from the air is not a means of replacing surface exploration but rather an invaluable aid which allows in many instances more thorough coverage of an area in a period of days than could ordinarily be accomplished in weeks or months on the ground. The nature of the country is clearly displayed on aerial photographic maps and exploration or field check programs can be intelligently planned in regard to geologic features, topography, roads, and streams.

Aerial photographs reveal the distribution and characteristics of land forms and erosional features far better than by examination on the ground, because the main structural trends are more impressive and stand apart from the intricate detail that at times is confusing in surface exploration. Correlations of rock formations are simplified; in rugged areas, much tedious ground travel is saved in tracing contacts from one point to another. Where outcrops are consistent or massive, the features of anticlines, synclines, low-dipping or flat-lying horizons, faults and joint systems are readily apparent. In areas where structural features and sedimentary beds are obscured, the topography, vegetation, or soil patterns often disclose their identity.

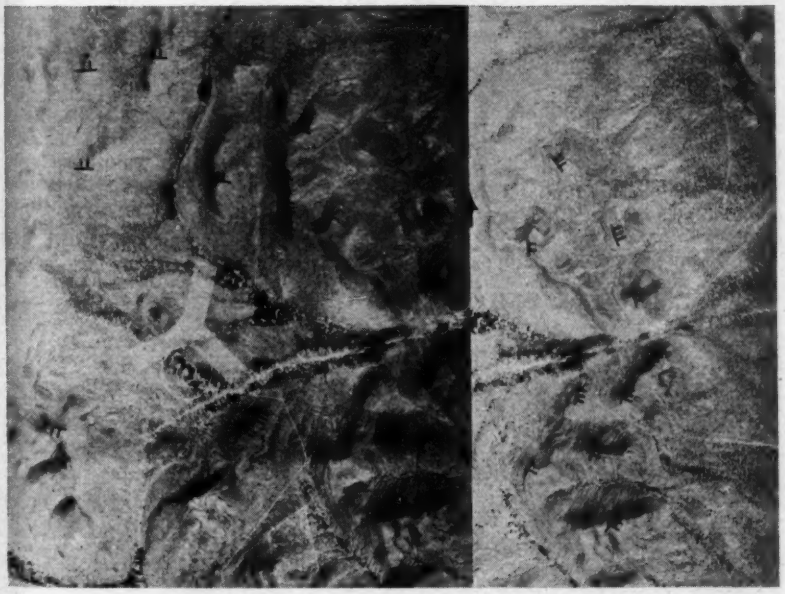
Cultivated lands, different soils, and even rocks of exactly the same colors but of unlike composition, reflect light in varying degrees of intensity and these delicate tones are reproduced on the photographs. Weak bedding planes occurring beneath more resistant layers are almost invisible on the ground, but from the air they are occasionally shown by color changes and by the shadows of erosional scarps.

Very striking soil and vegetation effects may express ancient stream channels and lines of faulting. The arching of strata by salt plugs results in circular or oval areas caused by a combination of hydrocarbon concentrations and chemical or thermal processes and by earth contrasts and radiating drainage. The surface may contain sink holes or have an irreg-

*Aerial Geologic Surveys, Denver.

Fig. 2—(Right) An index mosaic covering a symmetrical dome. An army bombing target is located on the top of the structure. Stereoscopic estimates of the amount of dip are expressed by the dip symbols; two prongs representing 3° to 10° and three prongs 10° to 25°. (Photo courtesy Muldrow Aerial Surveys, Inc.)

Fig. 3—(Below) Stereopair on the east flank of the dome in Fig. 2. The ability of stereovision with the unaided eyes can be acquired by almost anyone with normal sight or that corrected to normal vision. This stereopair can be brought into the three-dimensional effect by viewing the pair about 18 in. from the eyes and looking at a particular dip or outcrop as though it were a long distance away. (Photo courtesy Muldrow Aerial Surveys, Inc.)



ular appearance due to the solution of salt.

Beneath jungle cover, the alignment of faults, nature and dip of the underlying rocks are frequently distinguishable. In densely vegetated and tropical regions, structural highs may be apexed by a variation in timber growth or an open space. Certain igneous rocks, or soils resulting from their disintegration, are sometimes free of vegetation as a result of high magnesia and low lime, potash, and soda content. Relatively large quantities of chromium and nickel in ferromagnesian rocks create waste lands and barren soils.

A great deal of geologic information and sufficient data to make valid conclusions can be often gained from aerial photographs even where outcrops are rare and surface geology almost entirely lacking. After stereoscopic study and the plotting of roads and trails, a geologist knows exactly where to go to investigate his findings and thus avoids loss of valuable time that otherwise would be spent in needless ground search.

In the Rocky Mountain region, the stereoscopic study of vertical photographs is an extremely efficient means of reconnaissance, for in this province there is a wealth of rock exposures and inaccessible broad basins and uplifts remaining to be explored. The vast Tertiary basins have few persistent outcrops and roads are so infrequent that surface geology in the past has been a difficult undertaking. Every part of an area of interest has required critical investigation by the ground geologist for assurance that no outcrops have been overlooked.

The use of aerial photographs now allows the rapid map compilation of scattered formations and an analysis of structural relationships in a small fraction of the time necessary for ground surveys. Important areas are thus localized. A few dips discovered in reverse to the regional slope of the formations may provide an indication leading to the discovery of a structure.

Furthermore, the outlining of favorable portions of an area greatly reduces the expense of plane-table or geophysical work that is often advisable for additional definition and evaluation. Seismograph and gravimeter checking can be confined to smaller areas instead of requiring high-cost exploration for the same result over unnecessarily large areas

Fig. 4—An oblique view of El Capitan, the highest point in Texas. Rugged country of this nature with an abundance of rock exposures is usually remote and inaccessible for surface study, but is well adapted and quickly reveals structural features through photo geology. (Photo courtesy Muldrow Aerial Surveys, Inc.)

of dubious territory. Such methods of elimination have proved economical and successful in regions of poor surface exposures, with meager subsurface control, where geophysical and prospecting is indecisive. Interpretations of value are being found by the photographic review of areas once covered in detail and without success by surface geologists.

A good knowledge of structural relationships and geomorphology and wide experience in surface exploration are essential to successful aerial photographic interpretation. In addition, the photogeologist must be competent in minute observation to perceive all the features represented by the different shades and tones in the contact prints.

Color photography has witnessed continual improvements in haze-penetrating quality, speed, and sensitivity. When costs are lowered sufficiently to allow its general use, the ability to identify slight color gradations in rocks, soils, and vegetation will be of great benefit in interpretation. Thin markers in stratigraphic sections that are almost impossible to distinguish on black and white photographs will be more easily differentiated on color prints or transparencies. The recognition of soil-color variations in places of low relief, variegated beds, and the minor contrasts in formation colors that now record the same brightness or intensity of tone, will improve and expedite photographic analysis to a marked degree.

Tone distinctions on photographs are largely produced by the differences in residual soils with their associated plant life. Irregular areas and zones of vegetation may be indicative of structure to some extent. The distribution of rock units can sometimes be traced from these various tones. Great care, however, should be observed in this practice, since creep and slump often cover and completely obliterate adjoining formations, resulting in misinterpretation. Old beaches and terraces are commonly manifested by vegetational changes.

The proper appraisal of topographic form is exceedingly important. True stratification must be distinguished from peculiarities that suggest bedding, particularly in friable rock. Sloping gravel benches are sometimes mistaken for dipping formations. Stream drainage occasionally displays broad regional uplifts as on the plains of northern Alaska, but drainage patterns cannot always be relied upon to reveal structure. Although streams may radiate from salt domes and concentric structures or drain in opposing directions from the axis of an anticline in one area, such expressions may not be true in regions adjacent. Flat-lying beds or rocks of uniform composition ordinarily develop dendritic drainage while dipping beds usually show the trellis type.

Rock characteristics vary from place to place and within short distances in the same formation. They are also affected by the altitude and the amount of precipitation. Eccentricities of weathering and the indigenous vegetation help to identify the various types and to aid in their correlation. Sedimentary rocks are recognized by their characteristic parallel layers. Porous sandstones often support thick growths, while fine-grained and impervious shales do not allow much penetration of moisture and are usually thinly covered or barren. Limestones frequently lack essential plant foods and are sometimes devoid of vegetation.

Granites are distinctively rounded and hummocky, while metamorphic rocks show linear, banded, and foliated topography. Dikes often appear as prominent ridges and generally pursue nearly straight courses across the country, except where erosion has reduced their outcrop to discontinuous lines. Volcanic rock is distin-

(Continued on page 146)

Fig. 5—Kettleman Hills structure, California. The surface expression of this great oil field is plainly visible from the air. (Photo courtesy Fairchild Aerial Surveys, Inc.)

NEW DEVELOPMENTS IN Drilling Fluids

by J. P. Weichert*

Shale shaker installation in typical Gulf Coast deep drilling operation showing accumulation of undesired shale cuttings removed from mud system

DURING recent years there have been numerous improvements in drilling fluids. Most of these improvements have been gradual and may be classed as refinements in existing practices rather than entirely new developments which have greatly changed methods of control. The fact that we are now able to drill deep holes economically and that there are no formation barriers which cannot be penetrated (though some cannot be classed as economical operations) does show that developments in drilling fluids have kept pace with the other phases of the drilling industry. Before mentioning specific new developments in drilling fluids, a brief review of the components that go into making up an ordinary drilling mud is in order.

Drilling muds contain a variety of very finely divided mineral solids. We often refer to some of these finely divided solids as colloidal material. These extremely small particles which we think of as being in the colloidal range are, or have a behavior like bentonite. This fraction of the mud is the one that is most affected by contamination such as salt, lime, anhydrite, cement, etc. Likewise, these colloidal solids are the ones most responsive to chemical thinning agents such as the complex phosphates, caustic, and quebracho. Next we have the not so finely divided particles which may be classed as semicolloidals and which we may get from the shale formations drilled, or from commercial clays that we add to the mud. These particles are responsive only slightly to contamination or to chemical thinners. The next larger particles may be classed as low-density solids. Usually these are obtained from the formation drilled.

If we were to have an ideal mud, it would contain the proper ratio of each of these three different types of solids, as it is the purpose of the mud to form an impervious sheath or filter cake on the walls of the hole drilled. To build an impervious wall, we would first start with a large aggregate and then use material that is successively smaller in order to plug the voids between the aggregates as they are laid down. We might think of the solids of a mud behaving in this manner.

It is probable that all of our muds do not have the perfect particle-size distribution to form the thinnest, most impervious sheath, but if we think of drilling mud being a mixture of these various types of solids and realize the importance that each plays, even though we find many of them may not directly affect the properties of the mud as to viscosity and gel strength, we can perfect muds in the future which will be an even greater aid to drilling.

To summarize, the components which we find in all drilling fluids are the colloidal solids, semicolloidal solids, low-density solids, and, in the weighted muds, finely divided barytes. Most of the actual work on drilling mud involves the addition of chemicals, the purpose of which is to control the behavior of the above-mentioned solids so that the resulting mud will perform the functions needed.

Red Muds Coming to Fore

One of the most talked of recent developments is the increased use of red muds. For many years we have used caustic and quebracho as a treating agent for mud. In recent years we have found that by carrying a high-pH red mud, ordinary slack lime can be added in order to give a mud that is considerably more stable and which is very resistant to contamination. Most of our colloidal bentonites and semicolloidal clays are thought to be of a sodium base. We have known for some time that calcium-base clays are considerably less colloidal. In other words, they would give much less viscosity. By combining lime with the caustic-quebracho treatment is appears that we convert the sodium bentonites and sodium clays to calcium-base clays which are less colloidal and therefore give less viscosity.

Normally we think of lime or other calcium solids as being a flocculent for mud which has a very decided thickening effect. However, when added to a mud containing a large concentration of caustic and quebracho, we find that the lime converts the clays to calcium base and gives lower viscosities and lower gel strength, and it also gives a mud that does not tend to pick up solids from the formations when drilled. The lime red muds have proved extremely valuable for drilling colloidal shales such as encountered in the Gulf Coast and particularly when it is necessary to carry high mud weights.

Recently, we have found lime red muds can tolerate extremely high salt concentrations without losing

(Continued on page 152)

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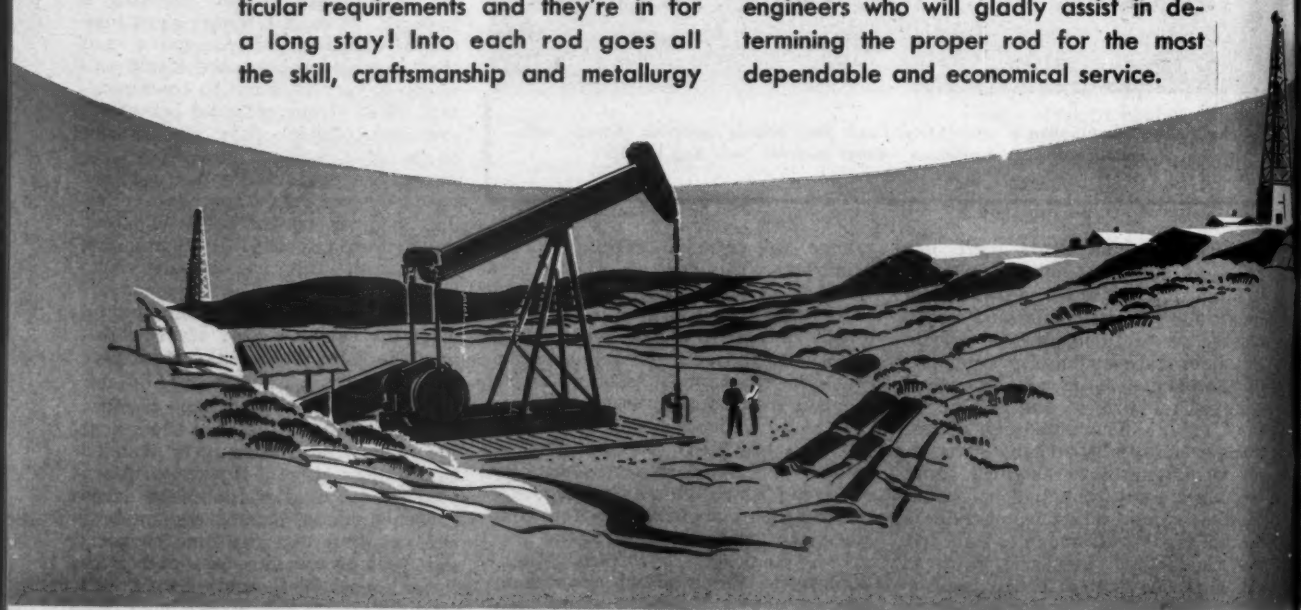

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ETE LINE OF OIL FIELD EQUIPMENT ★ FOR PRODUCTION

Thermofor Pyrolytic Cracking

Socony-Vacuum developed, this new process is similar to the T.C.C. in that hydrocarbon feed is contacted continuously with a moving bed of coals.

by S. C. Eastwood and A. E. Potas†*

THE postwar expansion of the chemical industry has created an unprecedented demand for ethylene and certain monocyclic and dicyclic aromatics. These chemicals are used in the manufacture of plastics, synthetic rubbers, insecticides, and many other organic chemicals.

Ethylene is obtained predominantly by recovery from refinery cracked-gas streams and by pyrolysis of propane and ethane. It is also produced to a limited extent by pyrolysis of liquid stocks, such as crude oils, in localities where light hydrocarbons are not readily available. In most parts of the country the price of propane is increasing to the point at which it cannot be cracked profitably to produce ethylene. Thus ethane and liquid feed stocks appear to be the chief source of charge stocks for future cracking installations.

*Socony-Vacuum Laboratories, a division of Socony-Vacuum Oil Co., Inc., Research and Development Department.

TABLE 1—T.P.C. CRACKING OF LIGHT HYDROCARBONS FOR ETHYLENE PRODUCTION

Type of operation—	Once through cracking		Recycle cracking Mixed light hydrocarbons	
Charge stock	Ethane	Propane	Fresh feed	Recycle
Composition, per cent weight:				
Methane + hydrogen	..	..	0.8	....
Ethane	99+	..	40.8	63.4
Propane	..	99+	40.0	14.4
Propylene	..	..	16.0	22.2
C_4's	..	..	2.4	....
Total	..	..	100.0	100.0
Pebble preheat temperature, °F.	1,525	1,770	1,510	1,500
Contact time, seconds	2.3	0.12	1.2	1.7
Recycle to fresh feed ratio, wt.	....	....	....	1.0
Yields, per cent weight on charge:				
Hydrogen	5.7	5.7	2.0	3.2
Methane	12.8	10.2	26.2	23.2
Acetylene	0 7	3.8	0	0
Ethylene	49.2	56.2	37.5	62.0
Ethane	18.2	11.6	3.5	....
Propylene	0.7	1.0	12.2	....
Propane	1.1	0.7	7.9	....
Butadiene	1.6	3.2	2.3	0
Butylenes	1.8	0.4	1.1	3.0
Butanes	1.0	0.3	0	2.0
C_5+	6.7	6.1	6.8	5.0
Coke	0.5	0.8	0.5	1.6
Total	100.0	100.0	100.0	100.0
Ethylene concentration in C_2 and lighter, Mol per cent	29.0	33.3	32.7	30.1

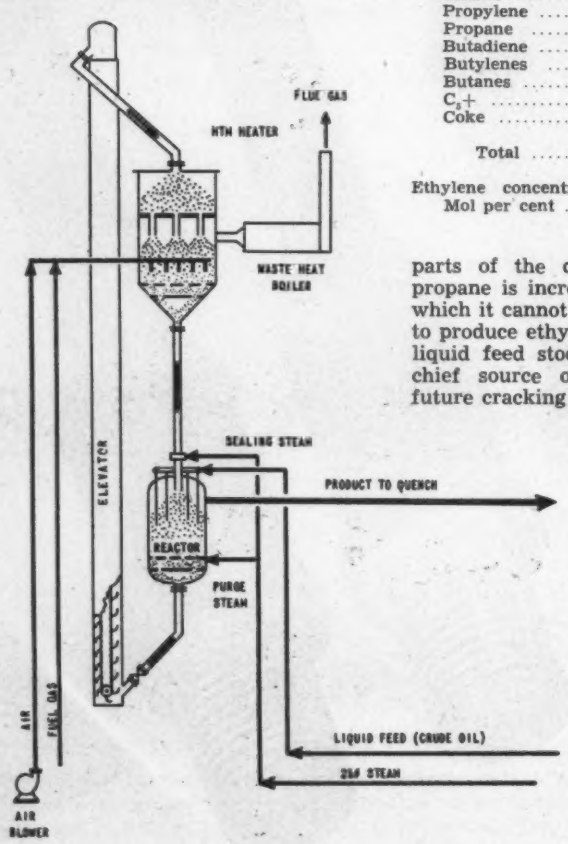

Fig. 1—T.P.C. unit for ethylene and aromatics production

Aromatics are obtained in about equal quantities from the coal tar and petroleum industries[1]. Coal-tar aromatics are byproducts of coke-oven operations and are, therefore, limited by the extent of these operations. The aromatics from petroleum are obtained

A new process, Thermofor Pyrolytic Cracking, has been developed for high-temperature, low-pressure cracking to produce ethylene and aromatics. This process is said to have the following advantages:

1. Wide flexibility with respect to charge stock.

2 Efficient transfer of heat from the primary source to the hydrocarbon being cracked.

3. Rapid heating of the hydrocarbon charge to high cracking temperatures.

4. Continuous elimination of any coke formed in the reactor during cracking.

5. Ability to introduce charge stock into the reactor without preheat.

by superfractionation and azeotropic distillation of select straight-run, cracked, or hydroformed petroleum fractions.

The cracking of ethane or liquid feedstocks to produce high yields of ethylene requires extremely high temperatures, low pressures, and short contact times. Several methods have been employed in the past to carry out this type of cracking; i.e., the use of tubular, regenerative, or molten-lead furnaces, and highly superheated steam. None of these methods, however, presents a satisfactory solution to the main processing problems inherent in this type of cracking; namely, efficient transfer of heat from the primary source to the material being cracked, rapid heating to high temperatures, freedom from fouling with coke, and simplicity of operation. To meet these problems a new process called "Thermofor Pyrolytic Cracking" has been developed in the Socony-Vacuum Laboratories at Paulsboro, N. J.

The T.P.C. Process

The T.P.C. process is based on techniques and knowledge acquired in the development of the T.C.C. process[2] and is similar to T.C.C. in that hydrocarbon feed is contacted continuously with a moving bed of solids. This new process is covered by patents assigned to Socony-Vacuum Oil Co., Inc.

The T.P.C. system comprises two main elements: a reactor and a heater. A bucket elevator is used to lift pebbles to the top of the unit where they are discharged into the heater. The heater serves to preheat the pebbles to the desired temperature level by direct combustion of fuel gas in the pebble bed. Any coke deposited on the pebbles in the cracking step is burned off in this stage. The hot pebbles flow by gravity from the heater into the reactor where heat stored in the pebbles is utilized to preheat and crack the hydrocarbon feed. The cooled pebbles from the reactor flow through a throttling valve, into the elevator which returns them to the top of the unit for reuse. A specially designed baffle system is used to prevent channeling of the pebble flow in both the reactor and heater. A diagrammatic sketch of the T.P.C. system is shown in Fig. 1.

Pebbles satisfactory for use in this process are noncatalytic refractory materials of spherical shape 0.2 to 0.4 in. in diameter meeting the following requirements: (1) high density—for compact unit design, (2) high specific heat—to reduce the weight which must be circulated, (3) high resistance to wear, spalling, and breaking—to minimize replacement rate, (4) low abrasion characteristics—to prevent excessive wear on vessels, and (5) high softening temperatures. Several materials developed by refractory companies appear to meet all of the above requirements.

One of the problems encountered in the development of the T.P.C. process was to find an efficient means of preheating the pebbles. This led to the development of a heater employing direct combustion of air and gas in the pebble bed. A pilot-plant heater representing a full-scale section of a proposed commercial heater has been operated for several years. This heater is capable of heating about 2 tons per hour of pebbles from 1,000° to 1,600° F. It was found that by proper adjustment of all the variables involved, burning efficiencies approaching theoretical can be obtained with 0 to 5 per cent excess air and with complete combustion to carbon dioxide and water. Externally fired heaters can be used but they are more expensive and less efficient.

Flow of hydrocarbons relative to pebbles through the reactor is countercurrent. Charge stock may be partially heated outside the reactor or may be introduced cold directly into

TABLE 2—TPC CRACKING OF LIQUID FEED STOCKS FOR ETHYLENE PRODUCTION

Charge stock—	Michigan crude	East Texas crude	Slaughter-Duggan crude	Mirando crude	Naphthenic catalytic light cycle stock
Properties:					
Gravity, A.P.I.	34.8	38.4	31.0	21.2	26.6
Aniline point, °F.	160	172	143	131	114
Sulfur, weight per cent	0.39	0.33	2.30	0.24	0.28
Distillation, °F.:					
I.B.P.	223	148	150	240	412
10 per cent volume	328	290	252	448	459
50 per cent volume	572	595	585	620	510
90 per cent volume	993	980 at 80%	902 at 75%	915	600
Pebble preheat temperature, °F.	1,550	1,515	1,500	1,500	1,515
Yields, weight per cent on charge*					
Hydrogen	0.9	0.7	0.7	0.7	0.6
Methane	14.8	14.1	15.3	13.0	10.8
Ethylene	28.8	22.3	17.9	12.5	11.7
Ethane	3.5	4.3	4.5	3.0	2.3
Total C_2 + lighter	48.0	41.4	38.4	29.2	25.4
Propylene	6.4	12.2	8.0	6.8	6.5
Propane	0.7	0.7	0.6	0.6	1.0
Butadiene	2.5	3.1	1.0	1.6	1.0
Butylenes	1.4	3.0	1.7	2.9	3.0
Butanes	0.9	0.6	1.2	0.2	2.7
Total C_5's	1.0	0.7	1.4	1.8	3.6
Total C_3's to C_5's	12.9	20 3	13.9	13.9	17.8
C_6 to 500 F. liquid	36.4	36.5	44.1	29.6	24.7
500 F. + liquid				25.6	30.5
Coke	2.7	1.8	3.6	1.7	1.6
Total	100.0	100.0	100.0	100.0	100.0
Ethylene concentration in C_2 and lighter, Mol per cent	40.9	36.7	30.5	26.1	28.4

*The light hydrocarbon distribution does not include H_2S. In the above operations on sweet stocks the H_2S produced is small (0.1 weight per cent on charge); however, on the Slaughter-Duggan crude, the H_2S is estimated to be 1.0 weight per cent of charge.

TABLE 3—AROMATIC DISTRIBUTION OBTAINED BY T.P.C. CRACKING OF LIQUID FEED STOCKS

Charge stock—	Mirando crude	East Texas crude	Naphthenic catalytic light cycle stock	Paraffinic catalytic light cycle stock	Virgin coastal naphtha
Aromatic yields, weight per cent:					
Benzene	7.7	7.8	5.9	5.9	12.4
Toluene	5.8	3.6	3.7	3.2	8.2
Xylenes	1.9	1.2	0.9	0.9	2.3
Styrene	0.1	0.2	0.2	0.1	0.3
Other C_8 aromatics	0.6	0.5	0.5	0.3	0.3
C_9 + C_{10} aromatics	1.2	1.0	0.8	0.5	1.4
Naphthalene	3.9	2.2	3.4	4.3	3.2
1-Methyl naphthalene	2.1	1.0	2.6	3.7	1.1
2-Methyl naphthalene	1.5	0.8	1.2	1.5	0.7
Total	24.8	18.3	19.2	20.4	29.9
Liquid boiling above 2-methyl naphthalene	28.4	20.0	31.8	33.5	15.9
Aromatic concentration in C_6 to 2-Me-Naph. fraction volume per cent	94.0	90.5	93.0	95.8	90.2
Ratio mono-cyclic to di-cyclic aromatics	2.30	3.57	1.67	1.14	4.98
Ethylene, weight per cent	12.5	21.6	15.7	16.6	15.0
Total aromatics + ethylene, weight per cent	37.3	39.9	34.9	37.0	44.9
Ethylene concentration in C_2 + lighter, Mol per cent	21.7	31 9	24.4	29.0	21.7

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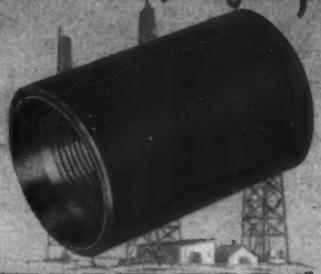

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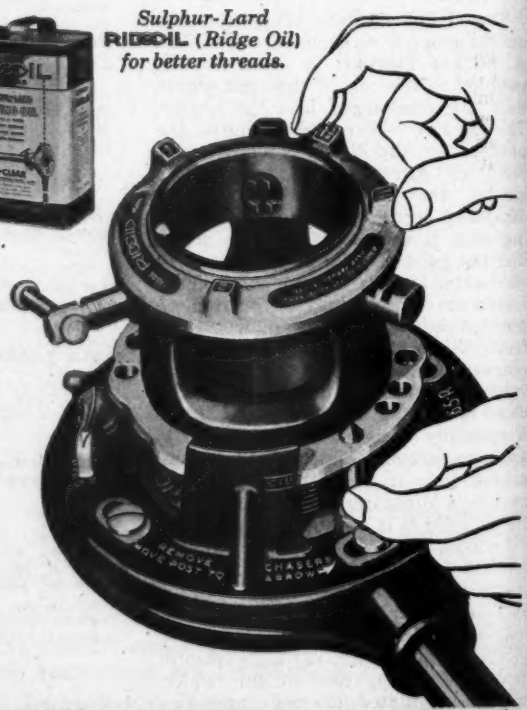

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the lower section of the reactor, where residual heat is available in the pebbles for preheating or vaporizing the feed. Extremely high rates of heat transfer, in the order of 15,000 B.t.u. per hour per °F. per cu. ft. of pebbles, are obtained in this type of reactor. Thus the charge stock is preheated to high temperatures very rapidly and undesirable cracking at low temperatures is minimized. The cracking temperature is controlled by the temperature of the pebbles entering the reactor and by the ratio of pebble circulation rate to hydrocarbon charge rate. The hydrocarbon contact time is controlled by the vapor rate through the reactor and the bed depth. Cracked vapors leaving the reactor are quenched immediately to prevent decomposition or polymerization of the ethylene.

The T.P.C. process has the advantage of being extremely flexible with respect to the type of charge stock processed. It can be designed to crack either gaseous or liquid feedstocks. Crude oils or reduced crudes can be handled just as easily as distillate stocks since any carbon formed on the pebbles during cracking is continuously removed from the reactor. Carbon deposited in this manner is an advantage with the T.P.C. process since it lowers the external fuel requirements in the heating stage.

Pilot-Plant Studies

T.P.C. cracking studies have been made in a 1-bbl.-per-day pilot unit capable of operating at temperatures up to 1,800° F. Charge stocks ranging from ethane to reduced crudes have been evaluated for ethylene and aromatics production. The preferred operating conditions for ethylene production vary with the charge stock but generally fall within the following range:

Pebble to hydrocarbon feed ratio, wt.	10-20
Pebble preheat temp., °F.	1,400-1,800
Hydrocarbon contact time, seconds	0.1-2.5
Pressure, psig.	0-5
Steam, per cent wt. of charge	0-50

Of the various charge stocks evaluated, ethane gives the highest yield, propane the next highest, while the lowest yields are obtained from aromatic and naphthenic-type liquid charge stocks.

Ethylene Yields from C_2 and C_3 Gases

Typical ethylene yields for T.P.C. cracking of ethane, propane, and ethane - propane - propylene mixtures are shown in Table 1. Once-through cracking of ethane with a pebble temperature of 1,525° F. and a contact time of 2.3 seconds gives an ethylene yield of 49.2 weight per cent. Recycling the unconverted ethane would give an ultimate ethylene yield of 60.1 at a recycle ratio of 0.22 parts recycle to 1.00 part fresh feed. Increasing the cracking temperature and decreasing contact time raises the once-through ethylene yield. For example, at a 1,770° F. pebble temperature and 0.12 seconds contact time, the once-through ethylene yield is increased to 56.2 weight per cent. At this temperature the yield of acetylene becomes appreciable, being 3.8 weight per cent of charge. An ultimate ethylene yield of 63.6 weight per cent would be obtained at a recycle ratio of 0.13 parts recycle to 1.00 part fresh feed.

Once-through cracking of propane with a pebble temperature of 1,510° F. and a contact time of 1.2 seconds gives an ethylene yield of 37.5 weight per cent. About the same conversion of propane and ethane are obtained at 1,510°-1,525° F. for the operations described above but ethane requires double the contact time as compared to propane.

Several C_3-C_4 gas mixtures, typical of feedstocks which can be recovered from refinery cracked gas streams, have been evaluated. An ultimate ethylene yield of 62.0 weight per cent was obtained from a mixture comprising 40.8 weight per cent ethane, 40.0 weight per cent propane, and 16.0 weight per cent propylene at a pebble temperature of 1,500° F., a

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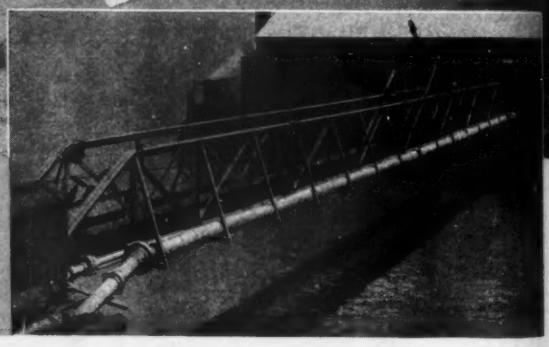
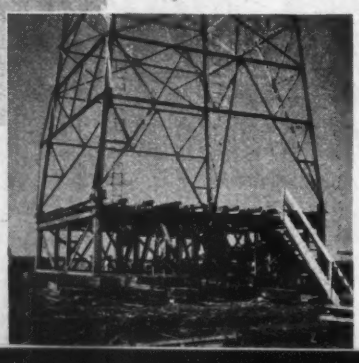
Drilling barge equipped with 136' high, 30' base, Emsco Type 18AR derrick. Note Emsco gin pole assembly, quadruple safety platform and 1st girt landing platform. Inset at right shows Emsco walkway used to connect drilling barge with boiler barge. Walkway is hinged permitting it to be raised during moving or when rough weather is encountered. Walkway supports pipe lines connecting barges.

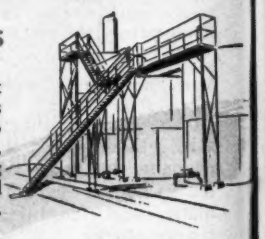


Looking up 136', Emsco 18AR derrick equipped with Emsco 14GP, 16,600 lb. capacity gin pole assembly. Also note Emsco tong hangers and quadruple safety platform.

MISCELLANEOUS STRUCTURAL PRODUCTS

Rigging up an Emsco derrick on a 10' high, Emsco 60HX substructure. This substructure is designed for deep drilling operations requiring heavy, bulky blowout equipment and racking of large amounts of pipe on derrick floor. It is well suited for skidding operations.





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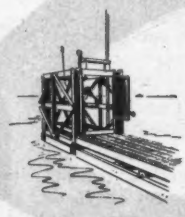

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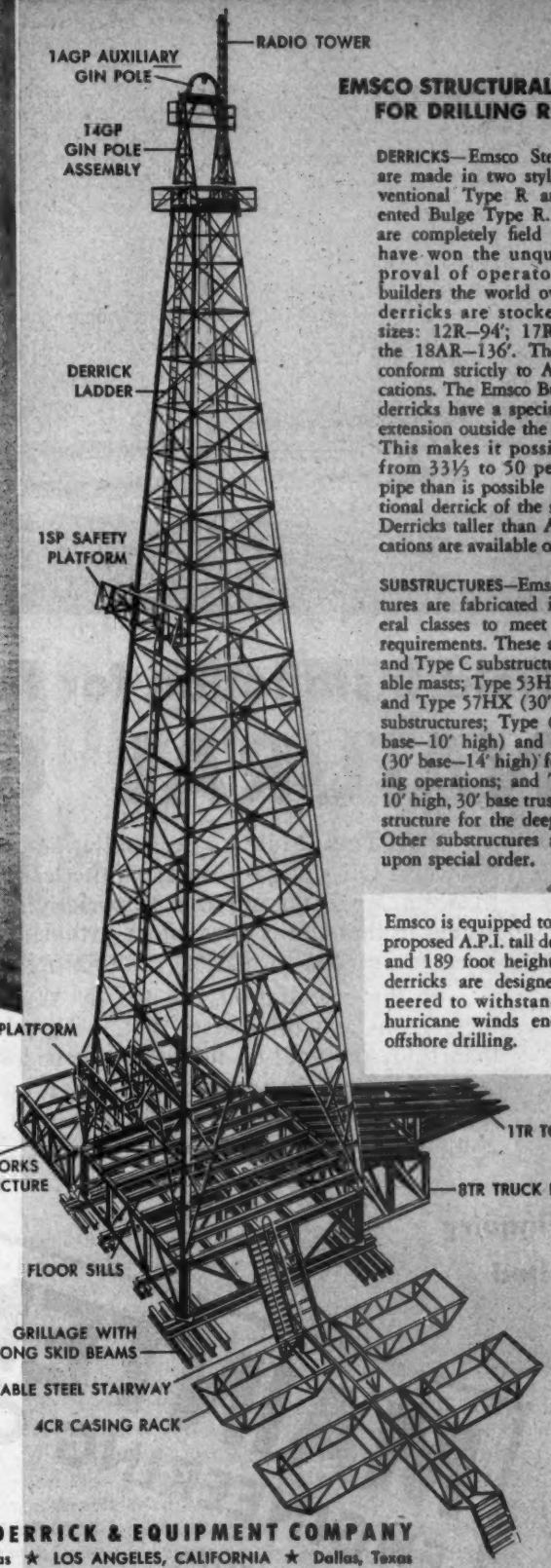
EMSCO DERRICKS AND SUBSTRUCTURES MEET ALL DRILLING REQUIREMENTS

Aerial view of offshore drilling location using Emsco 18AR, 136′ derrick and other structural accessories.



EMSCO STRUCTURAL ITEMS FOR DRILLING RIGS

DERRICKS—Emsco Steel Derricks are made in two styles—the conventional Type R and the patented Bulge Type R. Both styles are completely field proven and have won the unqualified approval of operators and rig builders the world over. Type R derricks are stocked in three sizes: 12R—94′; 17R—129′; and the 18AR—136′. These derricks conform strictly to A.P.I. specifications. The Emsco Bulge Type R derricks have a special "set-back" extension outside the derrick legs. This makes it possible to rack from 33⅓ to 50 percent more pipe than is possible in a conventional derrick of the same height. Derricks taller than A.P.I. specifications are available on order.

SUBSTRUCTURES—Emsco substructures are fabricated in four general classes to meet all drilling requirements. These are: Type M and Type C substructures for portable masts; Type 53HX (24′ base) and Type 57HX (30′ base) A.P.I. substructures; Type 60 HX (30′ base—10′ high) and Type 75HX (30′ base—14′ high) for deep drilling operations; and Type 80HX, 10′ high, 30′ base trussed type substructure for the deepest drilling. Other substructures are available upon special order.

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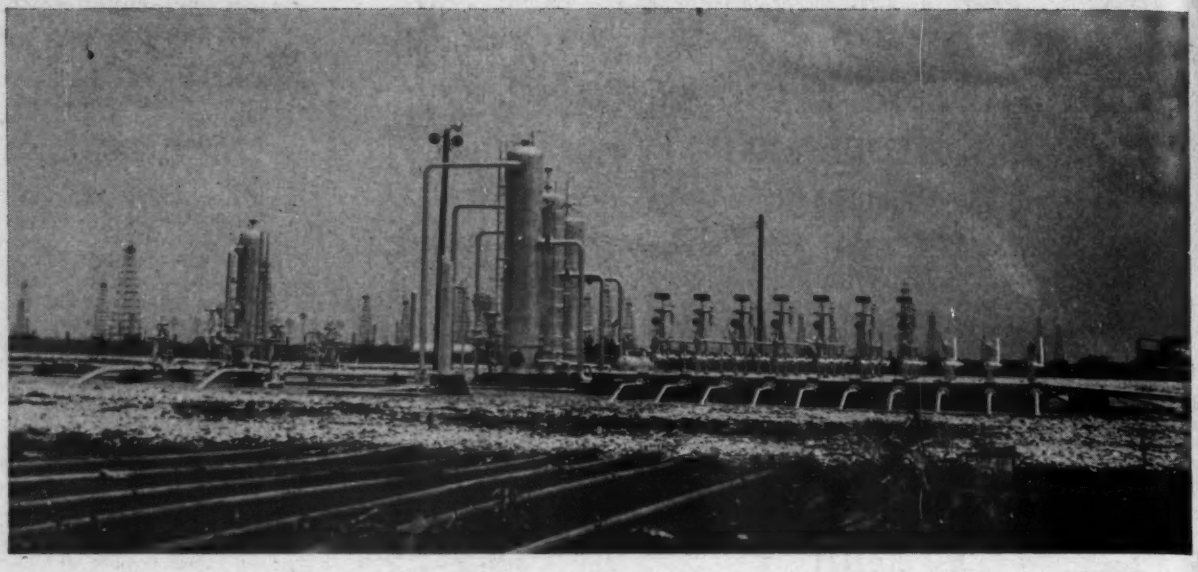

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contact time of 1.7 seconds, and a recycle ratio of 1.00 part recycle to 1.00 part fresh feed.

Ethylene Yields from Liquid Charge Stocks

Typical ethylene yields for T.P.C. cracking of several liquid charge stocks are shown in Table 2. The ethylene yields range from 28 weight per cent of charge from the most paraffinic stock to 11.7 weight per cent from the most naphthenic stock. As in the case of ethane, the ethylene yield can be increased from these stocks to a certain degree by increasing the pebble temperature and decreasing contact time.

The yields of other olefins, such as propylene, butylenes and butadiene, can be increased by decreasing the cracking temperature or contact time. Adjusting the operating conditions to increase the yields of these higher-molecular-weight olefins, however, generally results in a loss in ethylene yield.

Stimultaneous Production of Ethylene and Aromatics from Liquid Feedstocks

The T.P.C. cracking of liquid charge stocks to produce ethylene gives a fraction boiling between 150° and 500° F. containing 40 to 75 weight per cent aromatics. The concentration of aromatics in this liquid fraction can be increased to 90-95 per cent by increasing the contact time of the cracking reaction several fold. Although increasing the contact time through this range does not change the ethylene yield appreciably, it does decrease the ethylene concentration in the C_2 and lighter gas, making the recovery of ethylene more costly. This, however, is not a serious factor where both ethylene and aromatics are desired. Typical aromatic yields from several charge stocks are shown in Table 3. It will be noted that aromatic and naphthenic stocks give the highest yield of aromatics and that the ratio of monocyclic to dicyclic aromatics can be controlled to a considerable extent by choice in boiling range of the charge stock. Since the chief impurities in the aromatic fraction are olefins, high-purity aromatics can be prepared by acid treating to remove olefins, neutralizing, washing, and distilling.

An appreciable yield of material boiling above 500° F. is also produced from T.P.C. cracking of liquid feedstocks. This material has not been completely analyzed but undoubtedly is rich in high-boiling polynuclear aromatics which might be valuable.

Scale of Proposed Commercial Operation

Several chemical companies are actively considering the installation of T.P.C. facilities to manufacture ethylene and aromatics. One of the projects involves the cracking of 2,400 bbl. per day of East Texas crude to produce 50,000,000 lb. per year of ethylene. The quantities of other major chemical products from such an operation are shown in Table 4.

TABLE 4—PRINCIPAL PRODUCTS FOR A TYPICAL COMMERCIAL T.P.C. PROJECT (100 per cent Recovery Basis)

Charge stock	2,400 bbl. per day East Texas crude
Products—	
Ethylene, lb./yr.	50,000,000
Propiene, lb./yr.	20,300,000
Butadiene, lb./yr.	3,200,000
Benzene, gal./yr.	2,440,000
Toluene, gal./yr.	1,130,000
Xylenes, gal./yr.	400,000
C_8—C_{10} aromatics, gal./yr.	530,000
Naphthalene, lb./yr.	5,100,000
Methyl-naphthalenes, lb./yr.	4,200,000
Higher-boiling liquid, gal./yr.	4,720,000

References

1/ Synthetic Organic Chemicals United States Production and Sales—U. S. Tariff Commission Yearly Reports.

2. The Thermofor Catalytic Cracking Process, T. P. Simpson, L. P. Evans, C. V. Hornberg, and J. W. Payne. Proc. A.P.I. 23 (3) 59, 1942.

Ferd A. Bonstedt, who has been active in both the rubber and carbon black industries for the past 25 years, has joined Sid Richardson Carbon Co. as manager of the Akron (Ohio) division. The Akron office will eventually handle the sale of solvents produced by Sid Richardson Gasoline Co.

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Board at plant gives picture of turnaround schedule

Engineered Maintenance

at Pan American's Texas City Refinery

by S. B. Schapiro*

OPERATIONS at the Texas City refinery were started early in the spring of 1934. Initially, the plant consisted of a combination thermal cracking unit, a power plant, a cooling-water system, a small pipe still, a treating plant, and the customary shops, laboratories, office buildings, tankage, and piping systems. The major installations were designed and erected by nationally known engineering-contracting companies; the remainder of the facilities by company employes. It was from the latter group that the plant operating and maintenance personnel were obtained. For turnarounds of the combination cracking unit, the permanent maintenance organization was augmented by temporary employes.

The practice of having the refinery organization handle a part of the construction was continued for all future plant expansions. Generally, only the processing units and such special installations as cooling towers, boilers, and tanks were contracted. This allowed for the orderly expansion of the plant personnel, including supervisors, and proved advantageous from the standpoint of good industrial relations.

During the period from 1934 until early in 1941, the refinery was expanded physically approximately 300 per cent. Included in the expansion were two additional combination thermal cracking units, a nonselective polymerization unit, a second pipe still, a hydroforming unit, and the necessary auxiliary facilities.

By this time it became apparent that the size of the plant required organizational and procedural changes for handling maintenance. Furthermore, temporary employes for turnarounds were no longer available. However, before the problem could be pursued to a conclusion, the United States entered World War II and attention was directed to the all-out war effort. The wartime expansion included a phenol extraction toluene unit, an alkylation unit, a catalytic cracking unit, a pentane isomerization unit, a new steam-generating plant, and the accompanying yard tankage and piping systems.

Departmental Responsibilities

Late in 1943, work was resumed on the maintenance problem. Subsequently, a program was developed which has proved very effective. The first step was the establishment of departmental responsibilities (Fig. 1). Basically, it provided for the division of work according to departmental functions.

All engineering functions were

THE modern processing unit has emphasized the importance of maintenance as a factor in refinery operations. Since these units represent large investments, it is essential that equipment failures and down time for routine turnarounds be kept at a minimum.

To keep equipment failures at a minimum, facilities must be designed and installed in conformance with the best engineering practice for the anticipated operating conditions, and repairs and replacements must be made before actual breakdowns occur.

A normal turnaround involves an expenditure of 10,000 to 40,000 man-hours, depending on the size and type of unit, and the length of run. Therefore, off-stream time usually is determined by the ability to make available the greatest number of man-hours in the shortest time possible consistent with physical and functional limitations. This calls for careful planning and coordination and involves an over-all maintenance program founded on modern techniques instead of old-fashioned rule-of-thumb methods. Such a program is in effect at the Texas City refinery of Pan American Refining Corp., and is described in this article.

*Assistant general plant superintendent, Pan American Refining Corp., Texas City, Tex.

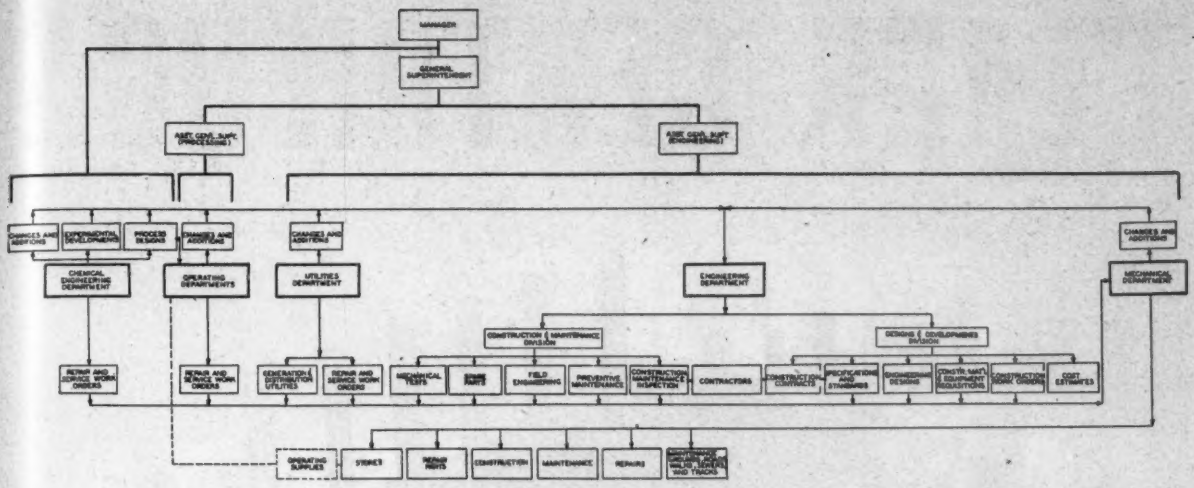


Fig. 1—Functional chart

centralized in a single department under the jurisdiction of a chief refinery engineer. The work was then separated into two divisions; namely, (1) design and development, and (2) construction and maintenance. A chief engineer was placed in charge of each division.

The design and development division prepares drawings and specifications, conducts negotiations with contractors for awarding contracts, makes economic studies and determines the applicability of materials and equipment for refinery installations, and issues work orders for all changes and additions to plant facilities.

The construction and maintenance division conducts mechanical tests, ascertains what spare parts are essential for repairs and replacements, supervises all contract construction, makes routine inspections of all plant facilities for determining when repairs and replacements are necessary for maintenance of safe and uninterrupted operations, inspects all repairs and replacements to insure that these conform with the plant specifications and standards, and conducts surveys to ascertain what conditions are contributing to equipment deterioration or excessive maintenance and recommends appropriate protective or corrective measures.

The last item is called "preventive maintenance" and is a major aspect of the maintenance program. Equally important is the inspection of all repairs and replacements. Previously, it was considered sufficient to limit engineering inspection to operating units and new installations. However, with the growth of the plant and the expanded personnel, this was found to be inadequate. The change has proved beneficial on numerous occasions. Consequently, with the engineering department being responsible for the mechanical condition of the equipment, the operating departments are able to devote undivided attention to operational problems.

Process designs and developments are handled by the chemical engineering department. These are translated into mechanical designs by the design and development division of the engineering department.

The mechanical department is responsible for performing the maintenance and construction work in the most efficient and economical manner, consistent with operational requirements. Except for the maintenance of the roads, grounds, trackage, and sewers, and the operation of the storehouse, all work requests made upon the mechanical department are received from other departments.

Mechanical Department Organization

The second step was the separation of the staff and line supervisory responsibilities in the mechanical department (Fig. 2). Six assistant department heads were appointed, with each having jurisdiction over one or more functional (craft) divisions. The assistant department heads meet daily with the department head and arrange for handling all complementary functions in the proper sequence and

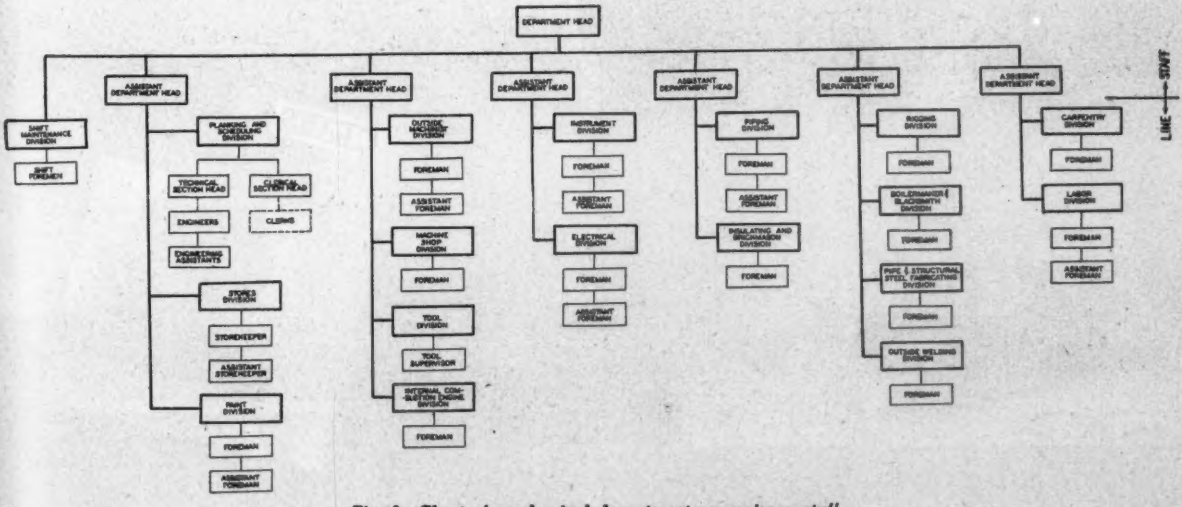
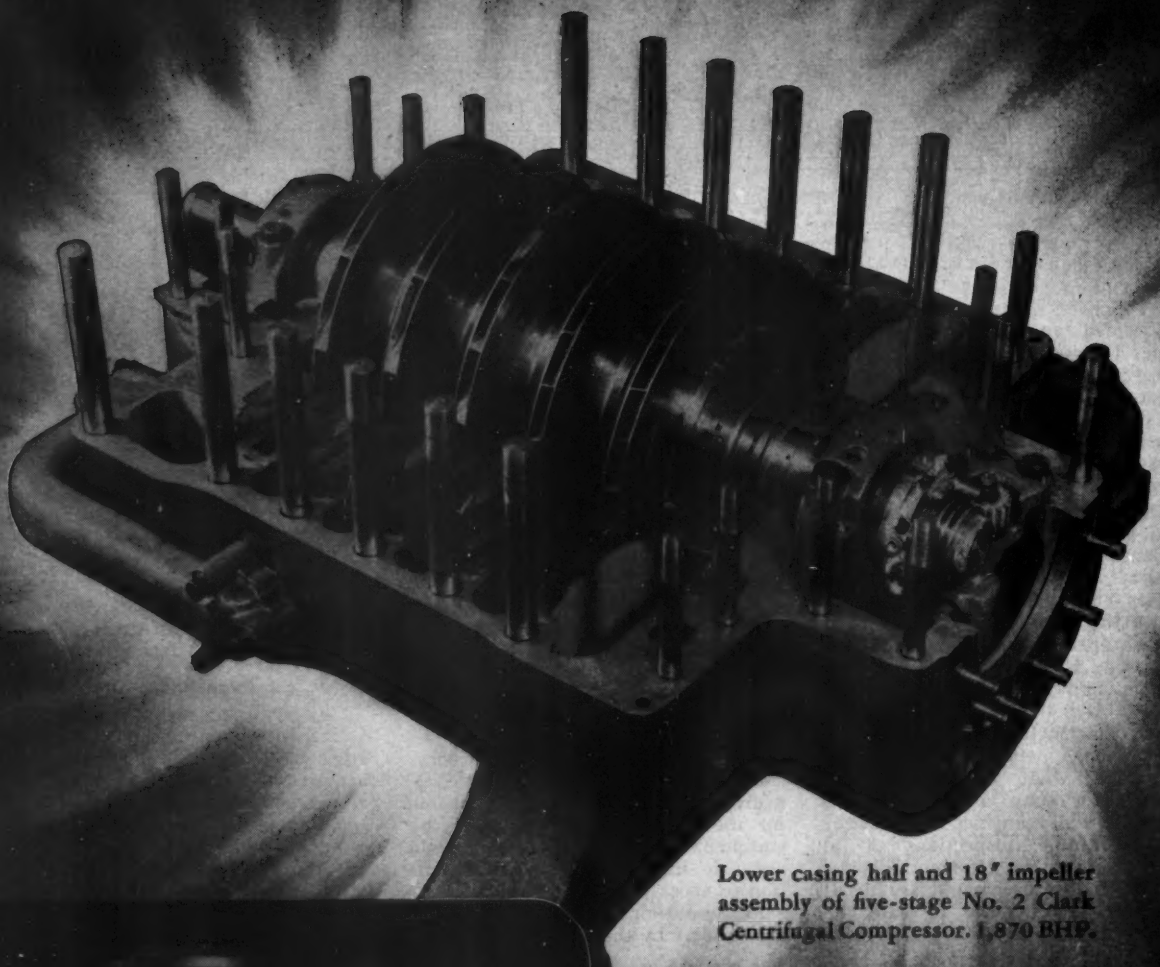


Fig. 2—Chart of mechanical department supervisory staff



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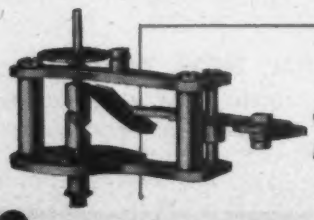

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review the work schedules. After the daily schedules have been reconciled, these are transmitted to the divisional foremen by the assistant department heads. The divisional foremen and assistant foremen are thereby relieved of considerable detail which makes it possible for them to concentrate on the duties essential for the attainment of maximum quantity and quality of work.

All departmental supervisors meet biweekly for the purpose of discussing interdivisional problems. These meetings also provide an opportunity to keep the supervisors advised of departmental and general plant matters.

Four engineers and two engineering assistants are assigned to the department to assist the staff supervisors. This group determines the sequence for the performance of work, the availability of materials, and the manpower requirements. It also prepares a monthly schedule showing the projected work for the next 3 months and the actual man-hours expended during the preceding month, makes studies to improve work performance, maintains a close liaison with the operating departments, and during turnarounds keeps the staff supervisors advised of the work progress.

Work-Order System

The third step was the establishment of a work-order system. Basically, this provides that a separate work order be issued for each job, except in the case of unit turnarounds and for the routine servicing of equipment. Jobs in the latter category are covered by annual work orders, while those for turnarounds are issued according to types of equipment (towers, exchangers, furnaces, etc.), and classes of work (cleaning, repairing, inspection, etc.).

The work order has been made an important factor in the maintenance program. These are prepared in sextuplet and distributed by the planning and scheduling division as follows:

Copy No. 1—Accounting department.

Copy No. 2—Department head who requested work (after acknowledgment by mechanical - department head).

Copy No. 3—Construction and maintenance division, engineering department.

Copies No. 4 and 5—Assistant department head of the mechanical department in charge of the principal craft.

Copy No. 6—Planning and scheduling division of the mechanical department.

However, when a job involves more than one craft, the planning and scheduling division contacts the assistant department head in charge of the principal craft for the purpose of determining the sequence of oper-

ations before distributing copies Nos. 3 to 6 inclusive, so that the subwork orders can be issued simultaneously for each allied craft. The subwork orders are prepared in triplicate, two copies being sent to the respective assistant department heads, and one being retained in the planning and scheduling division office. The assistant department head in charge of the principal craft retains the No. 5 copy, on which is recorded a list of the subwork orders, and forwards the No. 4 copy to the divisional foreman; the two subwork orders are handled similarly.

When work covered by a subwork order is completed, the assistant department head marks both copies accordingly and sends these to the assistant department head in charge of the principal craft. After noting on the No. 5 copy that the work covered by the particular subwork order has been completed, both copies of the subwork order are forwarded to the planning and scheduling division.

When the entire job has been completed, the divisional foreman in charge of the main craft returns the No. 4 copy of the work order to the assistant department head who then forwards both the Nos. 4 and 5 copies to the construction and maintenance division of the engineering department as notification that the work is ready for final inspection.

After making final inspection, the construction and maintenance division of the engineering department returns the Nos. 3, 4, and 5 copies of the work order to the planning and scheduling division. The No. 3 copy is then sent to the department head who originated the job, and the No. 4 copy to the accounting department; the No. 5 copy along with the No. 6 copy remain in the planning and scheduling division.

On the reverse side of the No. 6 copy a record is kept of the man-hours expended on the job. When the actual number of man-hours expended exceeds the estimated, the matter is brought to the attention of the department head for discussion at the daily meeting. If it is determined that the job was improperly handled, or that some other controllable condition obtained, such information is noted for future reference. During the course of the job, the No. 6 copy of the work order is kept in a visible Kardex file in the planning and scheduling division office where it may be referred to by all departmental supervisors.

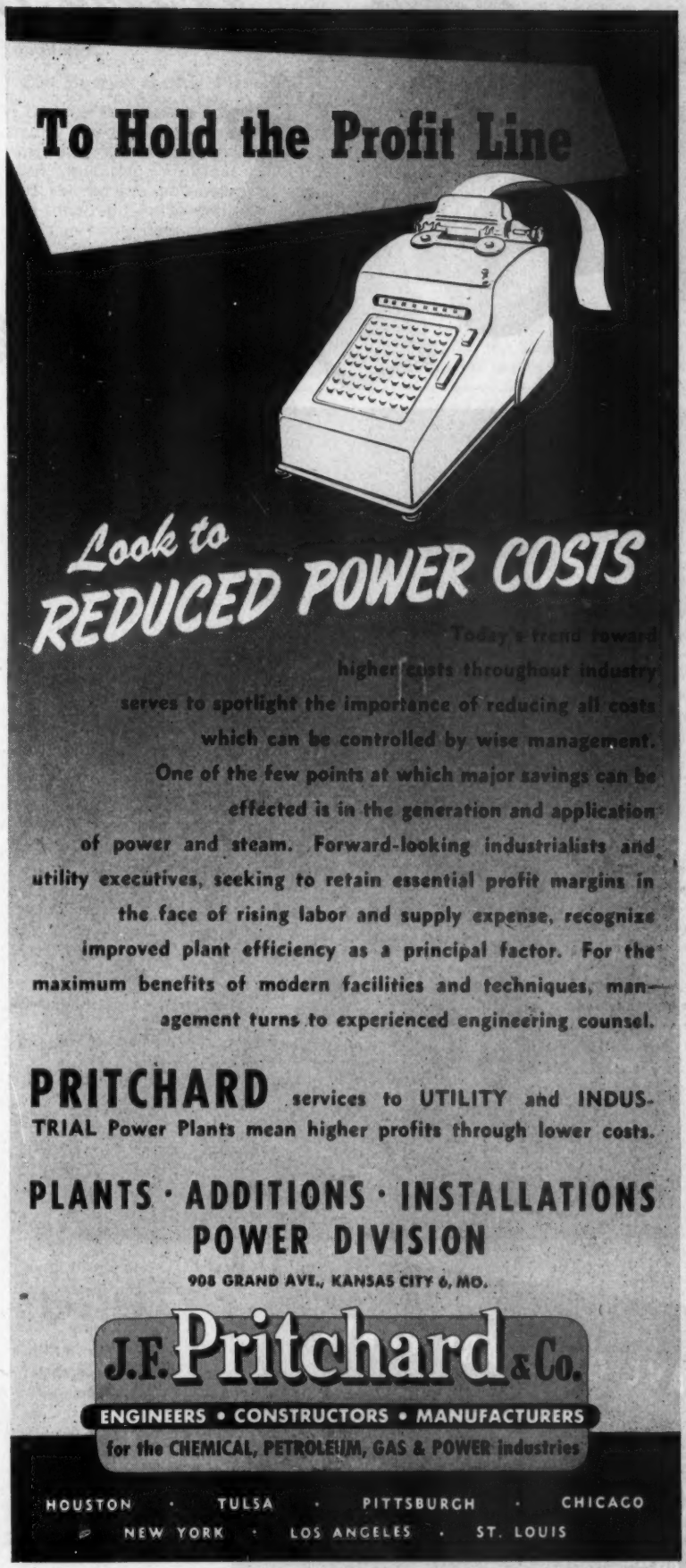
Balanced Organization

The fourth step was the establishment of a stabilized working force. All work orders for a 6 months period were classified as follows:

Class 1—Emergency repairs.

Class 2—Routine servicing of equipment.

(Continued on page 123)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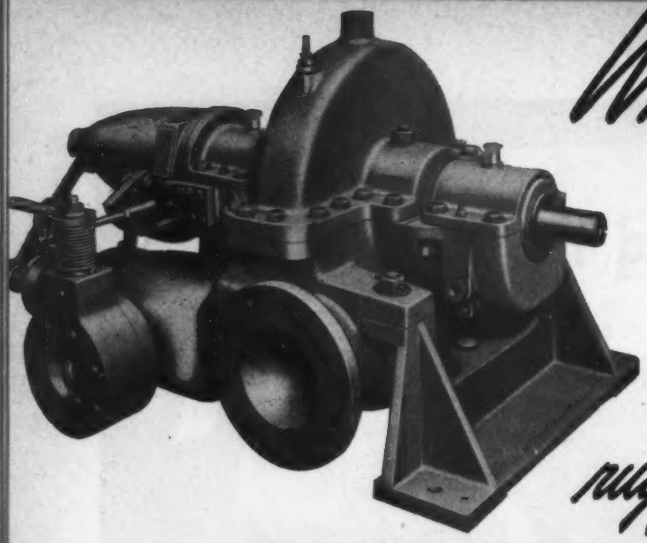

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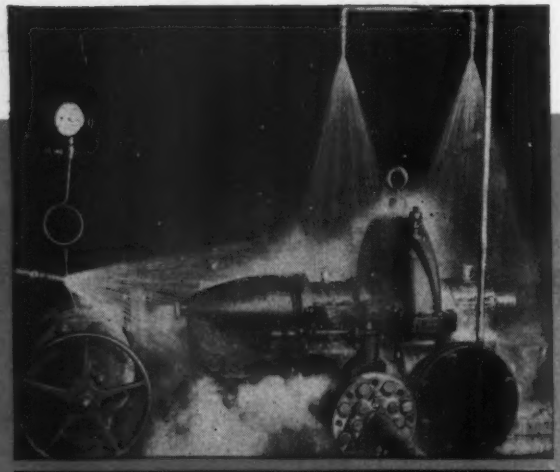

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The man-hours expended were then analyzed and a hypothetical organization developed based on handling a turnaround of a major operating unit concurrently with other nondeferrable plant work.

After making some adjustments to meet special conditions, there was evolved the so-called "balanced organization;" namely, a stabilized working force capable of handling all plant maintenance. This is accomplished by means of a priority system. Emergency repairs and routine servicing of equipment are given top priority. This constitutes the "base load."

Normal repairs fall into two categories; namely, deferrable and nondeferrable work. The latter represents the correction of conditions to meet specific operational requirements and consequently must also be given preferred handling. Therefore, all man-hours over and above those required for work in the top priority categories are available for unit turnarounds. At other times the man-hours are utilized for the deferrable normal repairs and such construction, preventive maintenance and dismantling that can be done other than when a unit is not operating.

The success of the balanced organization is dependent on careful planning and scheduling; interdepartmental cooperation; the coordination of all plant activities—operation, construction, and maintenance; the ability to effect temporary interdivisional transfers; and the handling of some plant construction by refinery personnel to make available during a turnaround sufficient manpower to keep the off-stream time within practicable limits.

Turnaround Assignments

As already mentioned, the type and size of unit and the length of run affect the man-hour requirements for turnarounds. Also, the work load for individual divisions is quite variable, being dependent on a number of factors. Therefore, efficient handling of the turnaround must be based on a careful study of the work requirements.

Several weeks prior to the turnaround, the planning and scheduling division assembles a work list and determines the work sequences, the estimated man-hours and time required for completing each job, and the man-hours that can be made available each day. With this information, interdivisional transfers are effected and where physical or other limitations obtain, men are assigned to the second and third shifts.

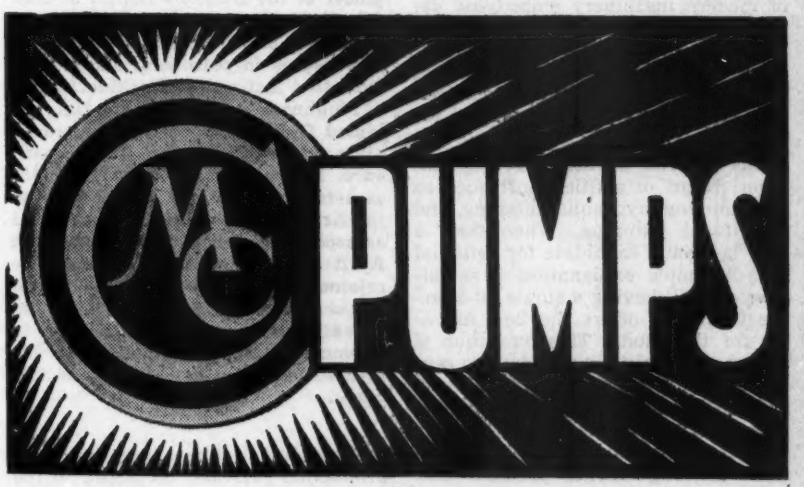
In this manner the length of the turnaround is fairly well established in advance and, insofar as practicable, all work is scheduled for simultaneous completion.

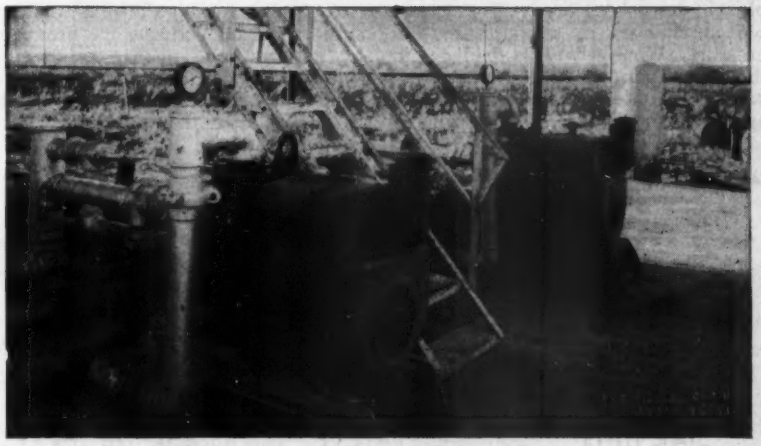
Coordination During Turnarounds

During the course of the turnaround, the engineers from the planning and scheduling division follow each operation. Unusual conditions and the actual man-hours expended and time required to complete specific jobs, are recorded on the job card. This information is used for planning and scheduling future turnarounds

As the work progresses, the supervisors watch the planning board very carefully. If for some reason a job requires more time than had been anticipated, the foremen reassign men from some other job which is ahead of schedule. The general progress of the work is discussed at the daily mechanical department meeting.

At present the large catalytic cracking unit, including its vapor-recovery system, is reconditioned with an expenditure of approximately 35,000 man-hours in a total elapsed time—from stream to stream—of about 15± days. An operating factor of better than 90 per cent is obtained for the two major combination thermal cracking units. Each of these units has a throughput in excess of 50,000 bbl. per stream day and the man-hours expended per shutdown vary from 15,000 to 25,000 man-hours—depending on the length of the run.





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Gas Lift as a Production Tool:

A Comparison of Gas Lift and Rod Pumping in the Same Field

by E. L. Petree

GAS lift is a mechanical process for lifting fluid, either oil, water, or a combination of both by using natural gas under pressure as the lifting medium. It was introduced to the oil industry quite early but lacked the necessary spark to assure its recognition as a practical tool in oil recovery. There was a shortage of high-pressure gas, necessitating the use of compressors which were inefficient and costly to operate. This picture has changed, however, with the advent of modern machinery embodying designs to obtain maximum efficiency and the discovery of huge high-pressure gas reserves. Seminole field of Oklahoma and East Texas field can be considered the proving ground for this production method.

Gas lift can be considered as another means of artificial lift such as rod pumping, hydraulic pumping, and centrifugal pumping. When does a well become a candidate for artificial lift? A simple explanation is as follows: A well having a single oil-bearing formation offers the best example for this study. This formation is imagined as existing in a stratum several feet thick containing hydrocarbons under pressure due to the existence of a structural trap. The hydrocarbons are said to be in equilibrium as long as the pressure and temperature remain constant. Complex hydrocarbons are very susceptible to changes in temperature and pressure. When a well is drilled into the formation, a certain reservoir pressure is noted normally referred to as the virgin pressure. The pressure in the reservoir declines according to the production rate and according to the type of energizing medium present.

Assuming a gradual decline in pressure as the oil and gas are produced by natural flow, the flow will continue until the reservoir energy is depleted to the extent that it is equal to or less than the hydrostatic head required to lift the fluid to the surface. Then, all movement of oil or gas from the formation into the well bore ceases; some form of artificial lift must then be employed to lift the fluid to the surface. Wells completed in reservoirs that have been partially depleted and have stopped flowing naturally are candidates for gas lift. Of course, it is presupposed that there is sufficient potential production to justify the installation financially.

E. L. Petree is chief petroleum engineer of the Houston district of Gulf Oil Corp. He is a 1934 graduate of Texas A. & M. College, receiving a B.S. degree in petroleum engineering from that institution. Working first as a roughneck at Port Barre, La., he joined Gulf immediately upon graduation. After considerable field experience, he went to East Texas in 1937 as petroleum engineer. Petree entered the Army engineers in November 1941 as second lieutenant and emerged in April 1946 a lieutenant colonel. He rejoined Gulf as zone engineer in East Texas and came to Houston as assistant chief petroleum engineer in September 1947. Promotion to his present job came in February of this year.

Evolution of Gas Lift

It might be well to briefly review evolution of gas lift.

1. **U-tube principle.**—The injection of gas into the casing annulus to expel the fluid from the tubing (see Fig. 1). This method is commonly referred to as "U" tubing and was used primarily to unload particularly weak wells and establish a flow for a short period. This method eliminated frequent swabbing and agitation by pumping. It was particularly good on high fluid level wells with good productivity indexes. In order to obtain best results, maximum submergence was used which, of course, depended on the pressure available and the gravity of the fluid to be lifted. This method was soon abandoned due to: (1) high kickoff pressures; (2) lack of control of gas-oil ratios; (3) best suited for high-fluid-level wells only; and (4) the method was inefficient and only temporary.

2. **Perforated collars.** — The next step was the use of a perforated collar set well below the static fluid level to sustain a constant flow by continuous gas injection (see Fig. 2). This resulted in an aerated column instead of a solid column of fluid followed by a charge of gas.

The perforated collar was more satisfactory than the U-tube method but still presented a problem in arriving at the optimum setting depth for efficient use of gas. This factor must be considered as some of the gas was purchased at high pressure and some was compressed to the desired pressure. Therefore, operating expenses could be reduced if the gas volume was controlled.

3. **Kickoff valves.**—A device was constructed that contained a ball and

Fig. 1

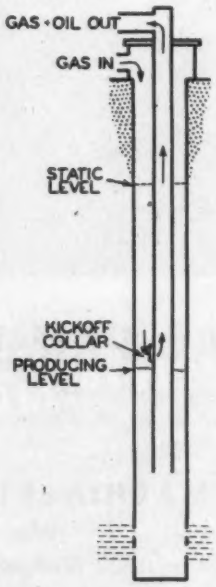

Fig. 2

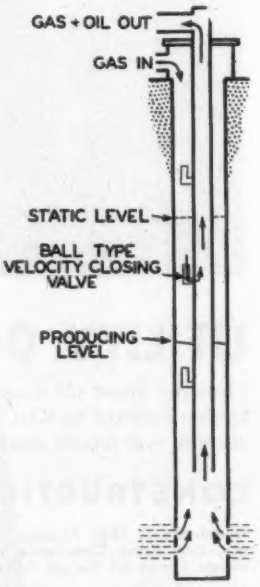

Fig. 3

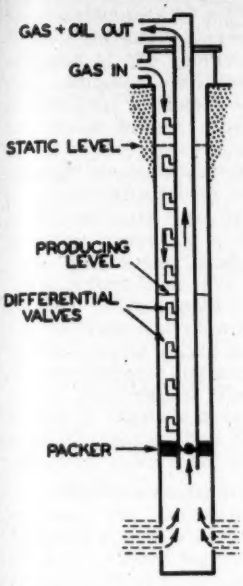

Fig. 4

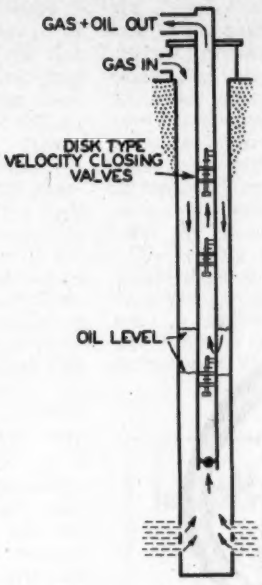

Fig. 5

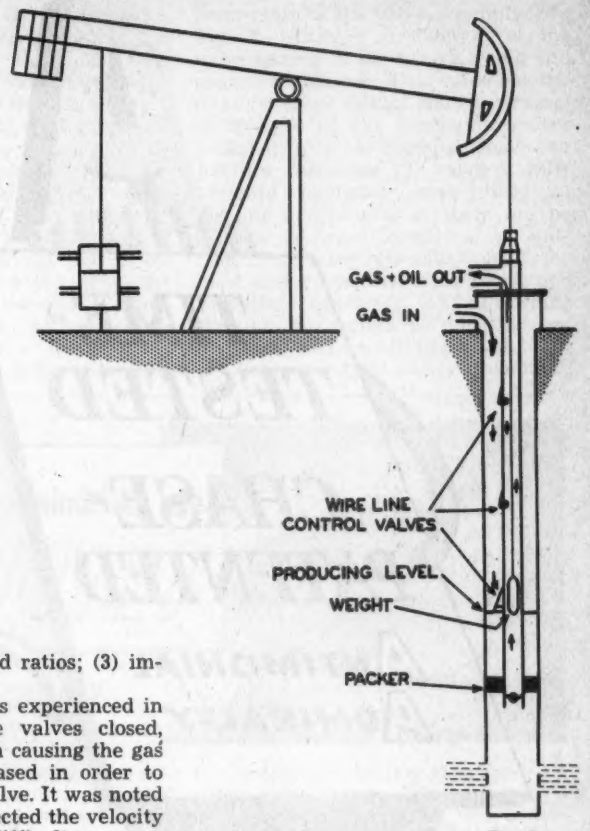

Fig. 6

seat so arranged that gas passing a given size port at a certain velocity would cause the ball to seat, shutting off the gas supply. (See Fig. 3.) This tool accomplished the following results: (1) A number of these devices could be placed in a tubing string to unload a well to its working fluid level with a minimum of pressure; (2) improved gas-fluid ratios; (3) improved economy.

Some difficulty was experienced in getting some of the valves closed, others closed too soon causing the gas pressure to be increased in order to U-tube to the next valve. It was noted that gas densities affected the velocity closing point. Some difficulty was experienced in getting the valves to reopen if operations required.

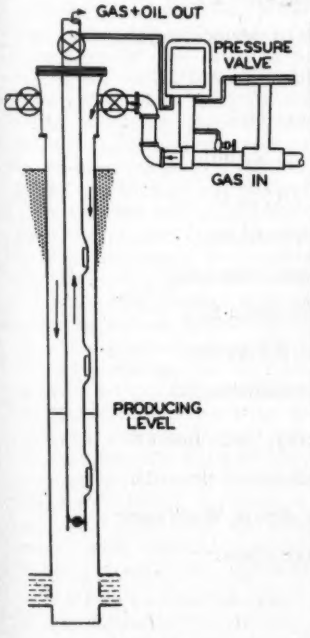

Fig. 7

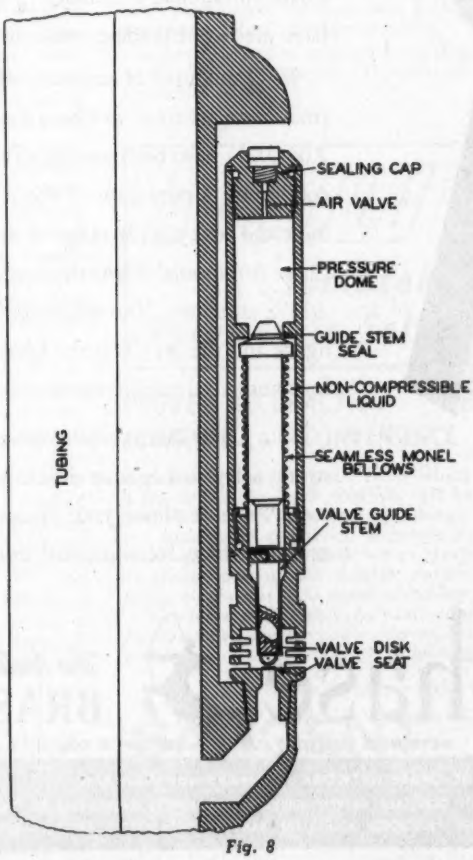

Fig. 8

4. **Velocity-closing valve.**—A device was constructed that could be closed by fluid velocity in the tubing. (See Fig. 4.) It consisted of a disk on the end of a rod connected to a piston and suspended in the tubing on brackets or guides. As long as the velocity of the fluid was below a certain rate, the valve would admit gas to the tubing from the casing annulus; but as soon as a predetermined velocity was reached the disk would move upward causing the piston to cover the gas port cutting off gas injection to the tubing. This valve was a definite improvement over early tools but there was one handicap: the tubing was restricted prohibiting the running of bombs to secure reservoir pressures and paraffin tools to eliminate paraffin depositions.

5. **Differential valves.**—The velocity-closing valve was improved gradually developing into the differential valve. (See Fig. 5.) This valve was controlled by the differential in pressure between the casing annulus and the tubing. Another important improvement was to place the valve on the outside of the tubing leaving the tubing string unrestricted. This would allow reservoir-pressure gaging, paraffin scraping, and swabbing. This valve was satisfactory in some types of wells, especially high-volume wells. Gas-fluid ratios tended to increase in

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low-productivity or marginal wells.

Some difficulty was experienced in arriving at the proper port size for gas admission into the tubing and proper heat treatment of spring stock to prevent fatigue. The valve differential would be a changing figure causing unsatisfactory operation. This valve was affected by separator pressures and long flow lines. The back pressure caused long blowdown periods with a throttling action of the valve rather than snap action, which resulted in high input ratios. A number of these valves would be placed in the tubing string spaced according to the operating gas pressure and valve differential. The number of valves is dependent on the pressure available, static fluid level, and productivity indexes on the well.

6. **Wire-line-controlled valves.**—The industry was not satisfied with the performance obtained from the differential valves because the amount of gas injected could not be controlled satisfactorily; neither could the working fluid level be determined except by running a flow test with a pressure gage in the hole. A very enterprising company perfected a valve that is run in the tubing string at intervals and was controlled by passing a weight bar through the valve to open it and raising the bar from contact with the valve to close it. (See Fig. 6.) A constant pressure was maintained on the casing annulus, and a gas-operated jack arrangement was used to raise and lower the weight bar suspended on a steel line. The frequency of the opening and closing of the valves was controlled by a time clock. The working fluid level could be determined by starting at the top valve and unloading the fluid to a point where it would remain fairly constant at a certain flow rate.

This piece of equipment offered some advantages over the differential valves, but there were some disadvantages that restricted its wide use: (1) Additional surface equipment that required maintenance; (2) reservoir-pressure gages could not be run into the hole due to the wire-line valve-control device; (3) paraffin deposition could not be cleaned from the tubing without removing the valve control mechanism; and (4) possibility of losing the weight bar and wire line in the hole causing a fishing or tubing job. This equipment was used in some areas with marked success because definite control was established.

7. **Pressure-controlled valves.**—Work continued toward developing a valve that could be surface controlled without the use of additional subsurface equipment restricting the tubing bore. The bellows-type valve with a pressure-charged dome was the result. This valve is constructed with a bellows attached to the valve stem and a pressure chamber that exerts a pressure on the bellows, tending to shorten it and close the valve. A casing pressure acting on the opposite side of the bellows and exceeding the charged pressure in the dome will cause the valve to open. The valve will close again after the casing pressure has decreased below the charged pressure in the dome; thus, a valve that could be surface controlled by increasing the casing pressure to open, and decreasing the pressure to close, the gas supply to the tubing.

The casing pressure is varied by employing a time clock to control the admission of gas to the casing annulus at a predetermined frequency that will produce the well at the most efficient rate. See Fig. 8 for a detailed description of the valve assembly. See Fig. 7, which is a diagram of the valve setting in the tubing string and control regulators. This valve has the most practical design and operational advantages of the preceding valves included in it: (1) pressure dome and bellows operation; (2) valve is fully pressure operated, snap-acting in opening and closing as there are no springs to cause throttling; (3) surface control permits selection of the most economical operating depth and injection frequencies; (4) full opening through the tubing permits the use of bombs and paraffin-removal tools; (5) lower gas-fluid ratios accounting

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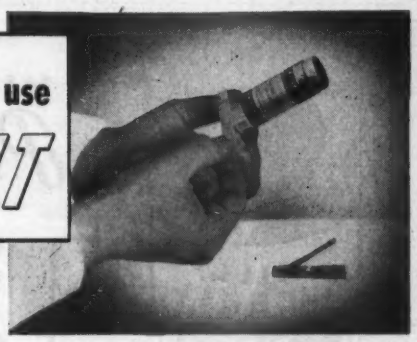

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The evolution of this production tool covered a number of years. Some of the early valves are in use today and are doing an excellent job.

As a matter of information there have been approximately 25 different makes of flow valves built and sold to the industry. There are about six valves extensively used at the present time.

Early Gulf Installation

One of the initial installations of gas lift made by Gulf in the Houston district was in 1931 at Hankamer, Tex. High-pressure gas was introduced into the casing annulus of the well to be lifted; this was an application of the U-tube method. The well produced 350 bbl. of fluid per day, 50 per cent being water. This installation was operated about 1 year and was abandoned due to diminishing gas supply.

Gulf's initial installation of kickoff valves was made in 1933 in three wells in East Texas field. These valves were used to kick off wells partially loaded with water. A total of eight wells were being handled in this manner by 1934. A small compressor unit was set to compress residue gas to a pressure of 400 psi. which provides ample gas to kick the wells off and restore natural flow for a period of time. The kickoff-type valves were removed and replaced with superior and improved equipment when the reservoir pressure declined and the increased water production indicated artificial lift was in order if the allowable was to be produced from the wells.

This, of course, necessitated a steady supply of high-pressure gas in sufficient quantities to sustain a reasonably constant casing or annulus pressure. A gas company promptly piped high-pressure gas into the field, as a number of operators had elected to produce all of their wells by gas lift, creating a market for gas. The initial cost of this gas was $0.02 per thousand cubic feet. This was a reasonable price for high-pressure gas. Gas lift was popular because a considerable initial saving could be effected by using gas lift over rod-pumping equipment.

In 1943 the price of high-pressure gas increased from $0.02 to $0.05 per thousand cubic feet. This increase in price of gas had its effect on operators employing gas to produce high-oil-water-ratio wells. The lifting cost increased to the point where a number of wells were uneconomical. A study was made to determine the economic limit of wells on gas ilft handling 300 bbl. of water per day, and compared to similar wells on rod pumps. The calculations were based on crude at $1.50 per barrel and $0.05 per thousand cubic feet for gas for gas lift. Economic limit of wells on gas lift producing approximately 300 bbl. of water per day was 11 bbl. of oil per day; economic limit of a well producing 300 bbl. of water per day by rod pumping, 4.0 bbl. of oil per day. Therefore, the price increase of gas caused abandonment of some wells on the west side of East Texas field and conversion to rod pumping of others.

During this period Gulf had 16 wells on gas lift; 5 of these wells were on the west side of the field and produced water. They were converted to rod pumping. The remaining 11 wells were on the east side where gas is obtained from joint-interest gas wells, located approximately 6 miles north of Kilgore, at a cost of $0.02 per thousand cubic feet. It was not considered practical to extend this line to possible points where gas might be used on the west side. The gas-lift wells on the east side are free of water but will not flow due to low permeabilities and reservoir pressures. As of January 1, 1948, there were 23 wells on gas lift in East Texas producing pipe-line oil.

Curve No. 1 indicates the trend since 1931 in Gulf's Houston district. The curve indicates the maximum number of wells producing by gas lift during the war years, 1941-1945. The industry was doing its share to curtail the use of steel until it was again available in the form of units, rods, and engines instead of ships, tanks,

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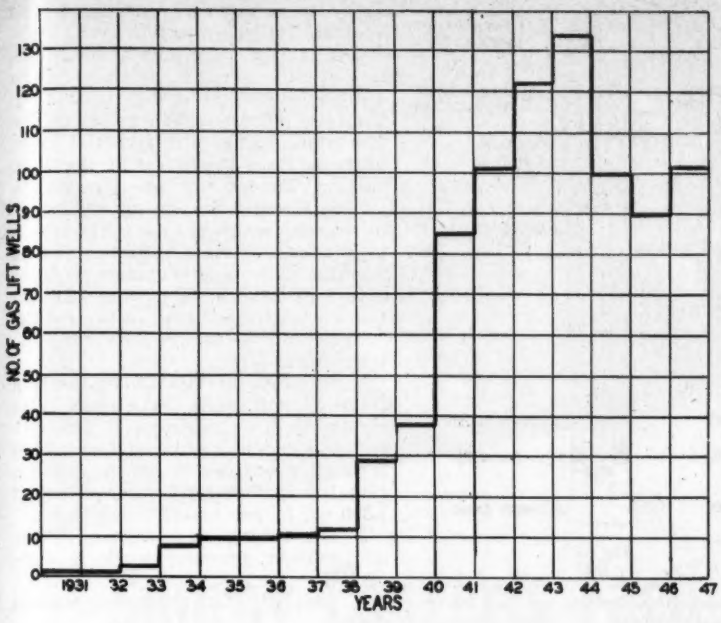
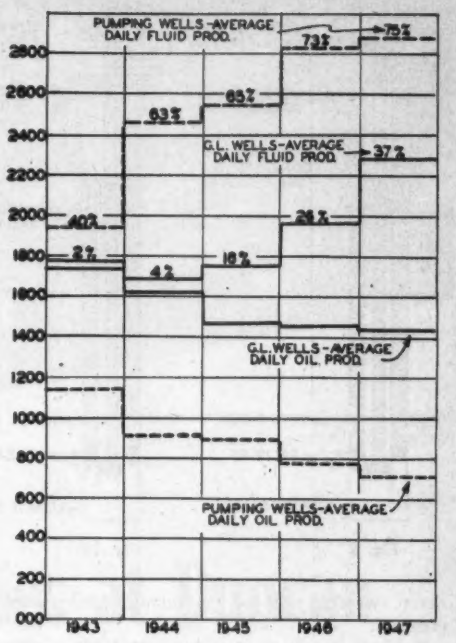


Curve 1



Curve 2

planes, artillery, etc. Gas lift was an expedient in some cases.

Comparison of Gas Lift and Rod Pumping

In order to bring out the value of gas lift as a production tool we have selected a field where gas lift and rod pumping are employed to produce oil. It is not possible to compare gas lift and rod pumping on the same lease, but it is possible in the same field. A field was selected that produces oil from a 5,300-ft. and a 8,100-ft. sand. It also produces gas from 5,100 ft. Two methods of artificial lift are now being used in the field, and they are so distributed that neither method is used exclusively in one producing zone.

Data were collected on several leases in this field from 1943 to 1948.

Curve 2 shows a graphic picture of the production data and affords a ready comparison of the daily average fluid, oil, and water produced during a 5-year period.

Curve 3 is a graphic picture of the production cost per barrel of fluid produced. The figures give gas lift a slight advantage over a 5-year period. This is not at all conclusive as pumping operator is producing with an average water percentage of 65 per cent as compared to gas-lift operator's 18 per cent.

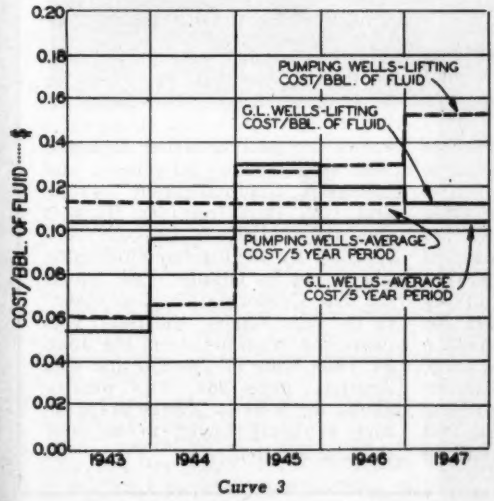
Curve 4 is a graphic picture of the production cost based on oil production. This curve is presented for information and is not a basis for comparison of the two pumping methods.

These costs do not include the investment for equipment necessary to pump or gas lift the wells. Gas-lift operator's investment to equip a well in this field is approximately $2,200; for 33 gas-lift wells, $72,600. Investment to install pumping equipment per well is approximately $7,000; for 33 wells, $231,000. A considerable saving has been effected on the initial installation of gas-lift equipment.

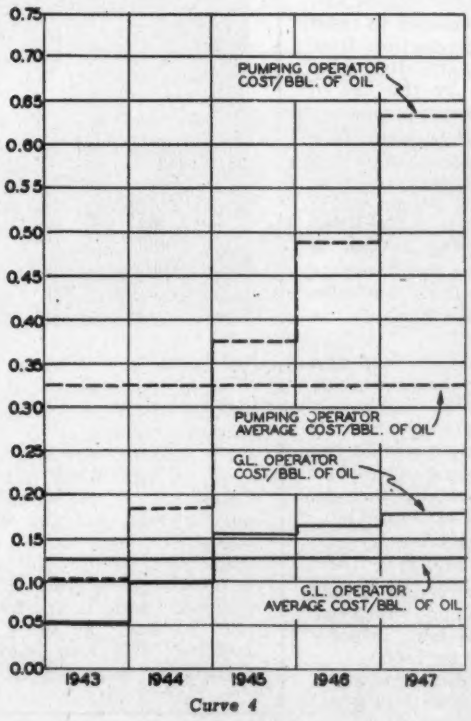
The decision to employ gas lift in this field was based on the following reasons:

1. Low cost on initial installation of equipment.
2. Operating

	Total	Number of wells Flow	Pump	Gas Lift	Prod./day
Gas-lift wells	46	13	0	33	1,550 bbl.
Pumping wells	34	1	33	0	698 bbl.



Curve 3



Curve 4

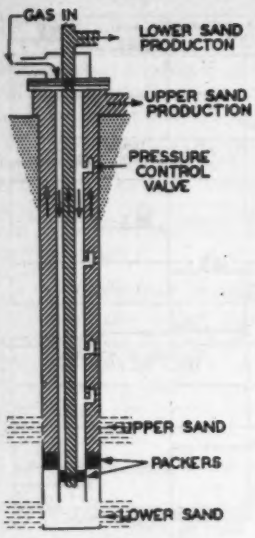


Fig. 9

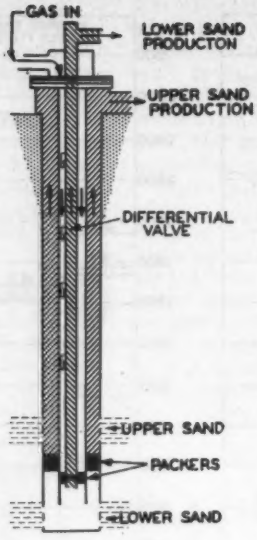


Fig. 10

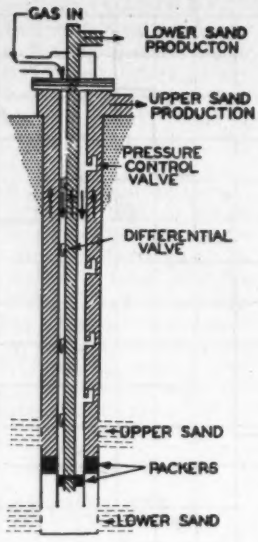


Fig. 11

force would not be materially increased.

3. High-pressure gas was available in the field at low cost.

4. Ample reserves of high-pressure gas.

5. Problem of construction and maintaining a gas-distribution system was simple.

6. Oil and water emulsions easy to treat.

7. Majority of wells have high fluid levels.

It is our opinion that this field can be depleted with gas lift as far as secondary recovery by artificial lift is concerned.

Gas Lift for Dual Completions

Tools have been developed to assist in maintaining the production from dually completed oil wells after natural flow has ceased, by the use of gas lift. It is possible to:

1. Gas lift the casing well, flow the tubing well naturally. Note Fig. 9 for the installation. A string of 1-in. tubing is run inside of 2⅜-in. U.S.E. tubing. Gas is injected in the annulus between the 1 and 2⅜-in. and is admitted to the casing through conventional-type flow valves. The tubing well flows naturally through the 1-in. tubing.

2. Gas lift the tubing well and allow the casing well to flow naturally. This installation is similar to 1 except the flow valves are run on the 1-in. tubing to admit gas to the 1-in. to flow the tubing well. The casing well flows naturally through the casing annulus. (Fig. 10.)

3. Gas lift casing and tubing well simultaneously. Note. Fig. 11.

In making dual-completion installations standard equipment which has proved efficient and reliable in ordinary installations can be used.

The pressure-controlled valve is run on the 2⅜-in. tubing and pressure differential valves are run inside the 2⅜-in. tubing on 1-in macaroni pipe. Check valves are used on the flow valves and a packer on the 1-in. tubing to prevent commingling of gas and fluid from the two producing zones. A surface controller is used to regulate the gas-injection cycle.

The surface controller maintains a constant pressure in the tubing annulus sufficient to lift fluid from the 1-in. macaroni. The valves on the macaroni, being a differential type, open as fluid builds up in the 1-in. tubing. The valves on the 2⅜-in. tubing flowing the casing well open on a predetermined time cycle, which allows gas to flow into the tubing annulus, causing an elevation in pressure sufficient to open the valve at the working fluid level in the casing.

The limiting factors on this type installation are:

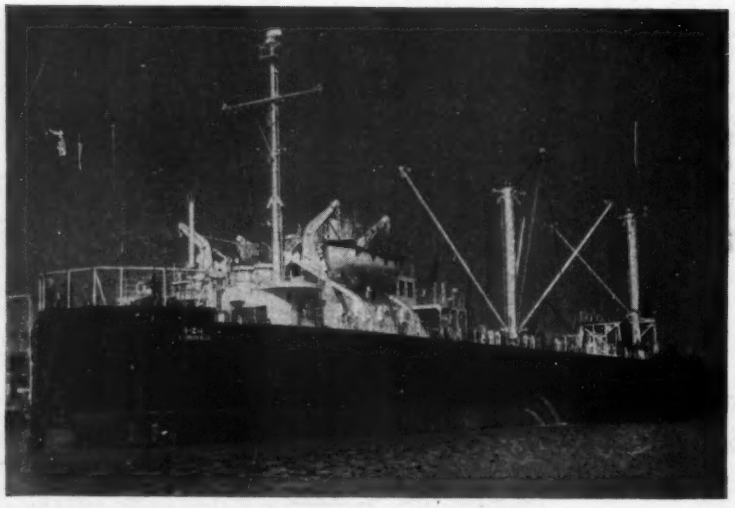
1. Diameter of the tubing limiting fluid withdrawal. Experience has shown that approximately 300 bbl. per day can be produced from 4,500 ft. with a pressure of 500 lb. through 1-in. tubing. Gas-fluid ratios averaged 1,300 cu. ft. per barrel.

2. The tubing is restricted as far as reservoir pressure work is concerned.

3. Hazards in running a macaroni string.

4. High gas-oil ratios will result, if the casing well has a low productivity index, due to slippage in the casing annulus.

LST CONVERTED TO DRILLING-BARGE TENDER



A CONVERTED Navy LST, this nonself-propelled drilling-barge tender, the S-24, has been placed in service at one of The California Co.'s drilling operations in the Gulf of Mexico off the coast of Louisiana. It accommodates not only the mud-pumping and mixing equipment, mud tanks, racks for drill pipe, casing and tubing, a cementing unit, storage for mud, cement, chemicals, and fresh water, and various auxiliary drilling facilities, but also quarters and recreation room for the drilling crews and general office, equipped with ship-to-shore telephones, and intership communication system and F.M. radio receiver. This is the second LST to be converted recently by Levingston Shipbuilding Co. at its Orange, Tex., yards for The California Co. Conversion of the first tender, the S-23, was described in an article in the June 24, 1948, issue of The Oil and Gas Journal, page 269. The picture shows the S-24 at Orange preparatory to being towed to its first drilling location.

Fig. 1—This aerial view of Sunray's Duncan plant gives a good idea of its efficient arrangement

Sunray Converts Facilities at Duncan With Minimum of New Equipment

by R. B. Tuttle

SUNRAY OIL CORP. since acquiring the aviation-fuel-manufacturing facilities at Duncan, Okla., formerly operated by Associated Refineries, Inc., has completed extensive revisions to equipment which it is now operating to produce motor and diesel fuels, various burning oils, and other products. The plant, purchased in August 1947 by Sunray, was the only one of 29 RFC wartime properties which was operated on feed stocks from as many as eight different refineries. Some of these feed-stock supply points were 50 to 100 miles away. During its war period of operation, feed stock was delivered to the plant via tank car, tank truck, and pipe line. No facilities for feed-stock manufacture were incorporated into the original plant layout which included several separate processing units, but all primarily for production of wartime aviation fuels.

The entire plant was shut down during the later months of 1945 and remained on idle status until taken over by Sunray. Except for crude oil, thermal cracking, and attendant facilities the original plant included all equipment necessary to a complete refinery. Major processes initially installed in the plant included a two-stage fluid catalytic cracking unit rated at 10,000-bbl.-per-day charging capacity; a 250-bbl.-per-day butane isomerization unit, and a 2,200-bbl.-per-day HF. alkylation plant. Other facilities incorporated in the initial installation were a gas-concentration unit, TEL blending plant, storage tanks, and loading racks. Principal accessory items for the original process layout were office and various other refinery buildings and housing for employes, a steam-generating plant, water supply and cooling system, and separator and sewer system. The entire plant including its accessories up to the time of its sale was maintained in standby condition from the time of shutdown several years earlier.

Sunray's program for revamping the plant went into operation soon

Fig. 2—During wartime this catalytic cracking unit was operated as a two-stage process. Now it operates on single-stage basis

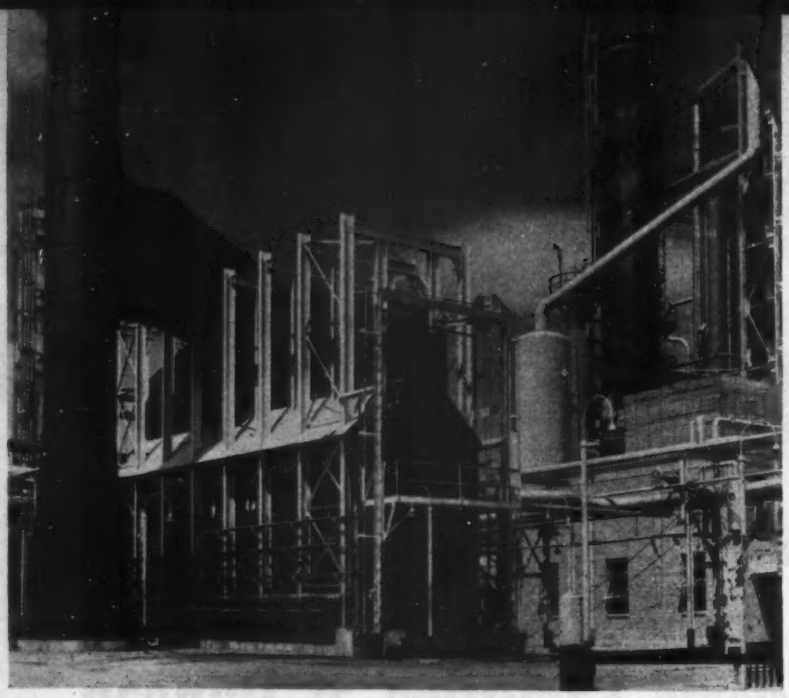


Fig. 3—The crude unit—the heater was originally included in the catalytic cracking plant layout

after it had obtained ownership. Major construction work was handled under contract by Refinery Engineering Co. In general the work involved in converting the plant into a complete unit for manufacture of products for current markets, consisted of installing crude-oil-processing facilities, a vacuum unit, a visbreaker, treating equipment for straight-run gasoline and naphtha, and a polymerization plant.

Major alterations made to the catalytic unit (see Fig. 2) involved increasing the size and altering the design of its cyclone separators and installing additional cyclone units. The catalytic unit is now equipped with a revised-type cyclone of a design worked out during wartimes. Under present operations only one fractionator is in service for the catalytic unit's two reactors.

The catalytic polymerization unit now operating in the refinery is made up of various salvaged items and some new equipment. Principal new items are the reactor vessels, heater, and charging pumps. All of the other processing equipment used in building the polymerization unit were salvaged from the alkylation unit, a part of the original plant layout. This group of items included instruments, pumps, two fractionating columns, and piping items.

Items for the construction of the crude units were salvaged from various of the processing installations incorporated originally in the aviation-fuel-plant layout. The heater for the crude unit (Fig. 3) was initially operated in raw-oil charging service at the catalytic cracker and the crude-unit tower served originally as the No. 2 tower for the same unit. All of the exchanger equipment now installed in the crude unit was salvaged from various sections of the original plant's processing units. Some of the heat-transfer items incorporated in the crude unit hookup were initially installed as high-pressure and low-pressure steam generators at the catalytic cracking plant. Coolers and condensers now in service at the topping plant came from the catalytic unit where they were employed similarly in the operation of that unit's No. 2 fractionator.

A part of the office space originally provided for operating personnel at the catalytic cracker was converted into the control room for the new crude unit. The building which now houses pumping equipment for the topping unit was originally part of the catalytic cracking plant. Except for a new panel board all control equipment now used for topping operations was salvaged. Pumps, piping, and a host of other items were also salvaged for building the crude unit.

A sizable portion of the equipment going into the refinery's new copper chloride treaters and its vacuum unit (see Fig. 4) were salvaged from the alkylation and isomerization units. Equipment for constructing the new visbreaker (Fig. 5) was obtained principally via salvage also. The visbreaker heater was salvaged from the plant's original gas-concentration unit where it operated in reboiler service. Most of the heat-transfer equipment was in service initially at the catalytic cracker. The column and reflux receiver installed at the visbreaker were made up of salvaged items as were all pumps except those in reflux and bottoms service which were purchased new.

Plans for close coordination of the Beckett and Allen refinery layout are now under study by company engineers. Although these plants are nearly 100 miles apart their operations may be closely coordinated, say the engineers. Part of the facilities necessary to coordinated operations, a pipe line between the two plants, and adequate storage and pumping stations have been installed.

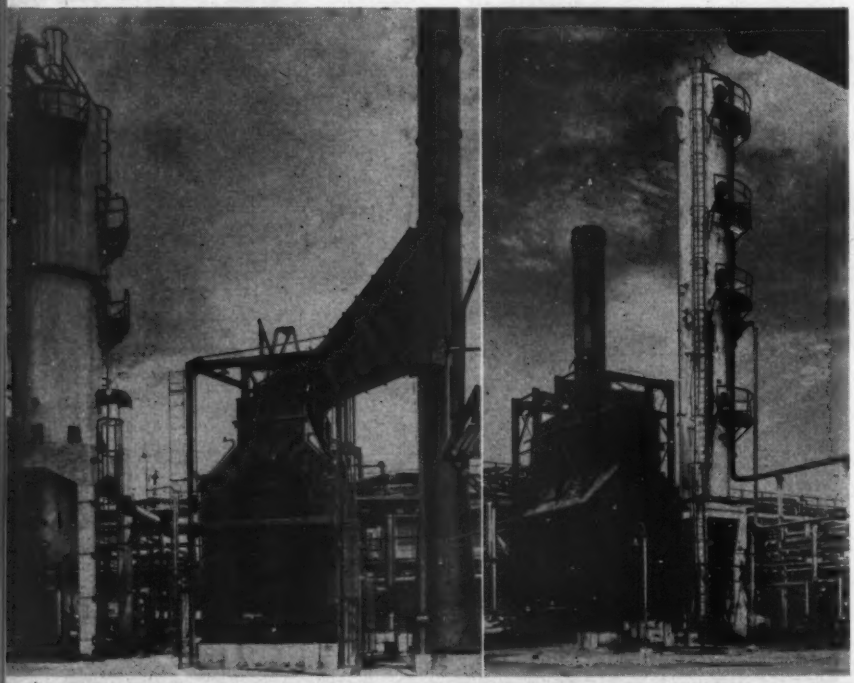
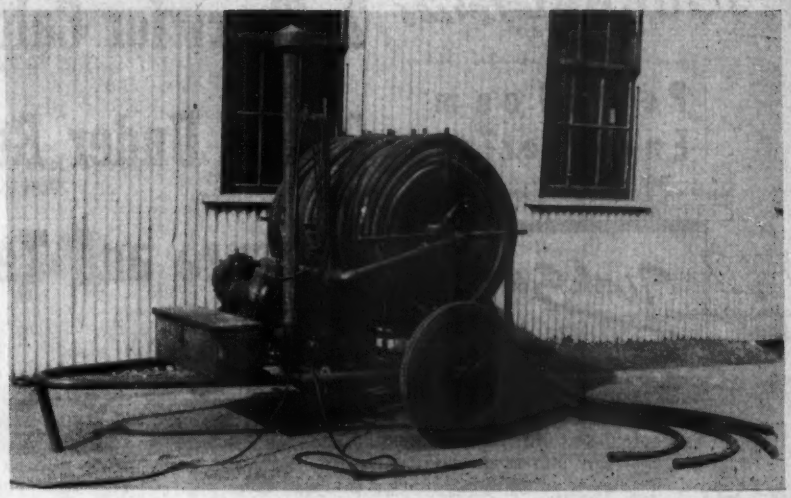


Fig. 4—(Left) Column and heater of the vacuum unit. Fig. 5—(Right) The new visbreaker at Duncan plant

PLANT PRACTICES

Four-Line Air System Provides Air to Masks



SUPPLYING air with certainty and in copious quantities to workmen, who are called on to work in tanks containing deadly or asphyxiating vapors, is always an important matter. To provide this supply easily and with certainty, the apparatus described below has been perfected by Standard Oil Co. (Indiana) employes.

The main idea was to provide a portable-type air blower, for use with air-line masks, which could be easily transported from one location to another. For this purpose a Davis-Roots pressure blower direct connected to a 1/6-hp. electric motor was mounted on a pipe frame. One end of this was a 1½-in. pipe axle between two auto wheels. Mounted directly above, and supported from the axle by 1½-in. pipe struts, are four hose reels each carrying 150 ft. of 1-in. hose. The axle, for the hose reels, is a 2-in. pipe which is connected, at one end, to the discharge of the blower.

When a tank, such as one which has contained ethyl fluid, is to be entered, the mask is put on one or more workmen, as the case may demand. The hose is attached and the workman enters the tank after the motor operating the blower is started.

Cutting-Torch Attachment Provides Center Pivot Point

WHAT may be accomplished with one cutting-torch attachment, and how it is operated, are illustrated herewith. Construction of the tool consists of brazing a coil-shaped holder for the torch nozzle to a ¼-in. rod. The end of the rod at the handle end of the torch is formed into a fork into which the handle is placed when using the tool. Position of the "center" or pivot point is made secure by tightening the thumb screw in the sleeve which may be moved to any desired position along the support rod.

Trailer Store for Maintenance Operations

TO speed up the supply of equipment and tools to the far-flung maintenance-crew members in Shell Oil Co., Inc.'s, Wood River, Ill., refinery, that company's engineers recently developed a special trailer which carries a multitude of equipment items to the sites of various repair, clean-out, and other jobs. It is a 10-ton job, and built to the specifications developed by the storekeeper. It is provided with telephone for quick communication throughout the plant, has its own heating-ventilating systems, and is equipped with electric connections. A wealth of bins, racks, and shelves facilitate the handling of equipment. The company is planning other such trailers for other refineries, since this trial period has shown the advantages obtained. According to data gathered, it appears that the trailer will "pay out" in a 3-month period. In a 6-week period, it served four shutdowns in a total of 20 working days, filled 1,100 orders, or 92 per cent of the total material required for those jobs.

JOURNAL-Series ON Petroleum Engineering Time Savers

2--Chart for Calculating Volume Of Gas Under Reservoir Pressure and Temperature

THE space occupied in a reservoir by a unit amount of free gas is a useful engineering quantity. It can be calculated directly by use of the gas law change between standard conditions and reservoir conditions. The accompanying chart is made to facilitate this calculation. It is based on the following equation.

$$v = \frac{14.7}{520 \times 5.61} \cdot \frac{T_r Z}{P}$$

where

v = the barrels of space occupied at T_r and P by 1 cu. ft. of gas measured at 14.7 psia. and 60° F.

T_r = Reservoir temperature, degrees Rankine

P = Reservoir pressure, psia.

Z = Super compressibility factor at P and T_r

As an example, a certain gas at 2,000 psia. and 190° F. has a Z factor of .60. The value of v is read from the chart using $T_r = 190 + 460 = 650°$ R. as indicated giving v = .00098 bbl. of space.

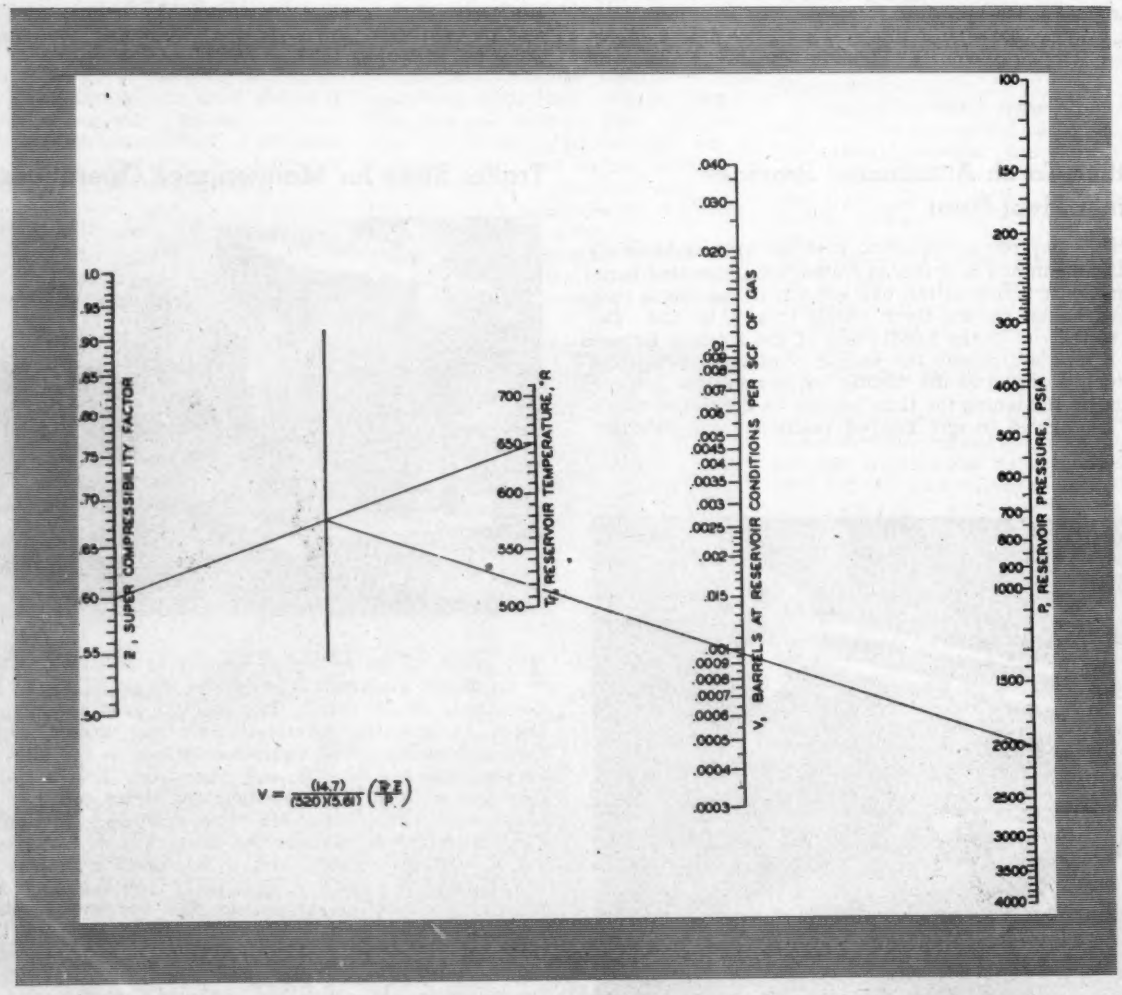

Z, SUPER COMPRESSIBILITY FACTOR
T, RESERVOIR TEMPERATURE, °R
V, BARRELS AT RESERVOIR CONDITIONS PER SCF OF GAS
P, RESERVOIR PRESSURE, PSIA
v = (14.7)/(520×5.61) (T Z / P)

Chart by W. A. Vestal, University of Oklahoma

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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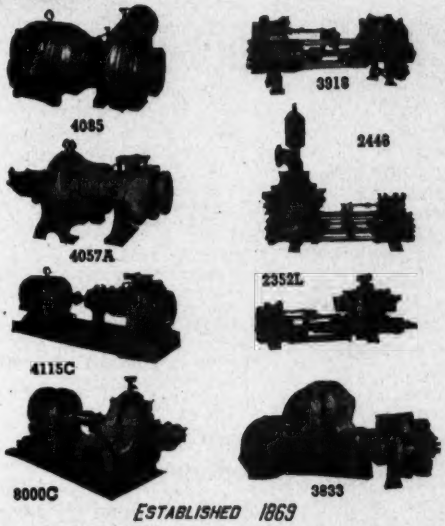

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Hypersorption

Simplified Flow Diagram

Can you give us a simple discussion of how the Hypersorption process works?—R. B. T.

The selective adsorptive action of activated carbon, etc., by which large molecules are adsorbed more completely than small molecules has long been known. However, continuous systems of removing the adsorbed material were not successful until the Hypersorption unit and process was developed.

Activated carbon is cooled (see Fig. 1) as it moves downward into the adsorption zone of the equipment. In the adsorbing section it catches the last traces of the desired hydrocarbon and , inadvertently small amounts of lighter gases. Waste or lean fuel gas is discharged from the top of this section. The carbon then passes the feed point and flows into a rectifying section where it is met by heavy hydrocarbon vapors which have been liberated in hotter sections which are lower in the column. These heavy hydrocarbons displace the unwanted light gases that were adsorbed in the upper sections and the heavy hydrocarbons travel downward on the carbon to the steaming section. In the steaming section the adsorbent is met with a stream of warm gases from the stripping section which lies still lower in the column and the make gas is removed as a side product from the top of the steaming section. Finally, the adsorbent passes from the bottom of the column through a steam stripper which removes the last of the useful gas. It is then lifted by means of a blast of gas to the top of the unit. A small portion is currently cycled through a small high-temperature steam stripper for the removal of traces of very heavy hydrocarbon impurities such as absorption oil vapors or lubricating-oil vapors. Gaseous products pass from the equipment through cyclone separators. The steam consumption is only 10-15 lb. per 1,000 lb. of carbon circulation. Dowtherm may be used for heating and a condenser and knockout drum is needed for the product gas.

Plant operations at Midland, Tex., for the recovery of ethylene from the methane overhead product of a low temperature fractional distillation unit (Kehde, Fairfield, Frank & Zahnstecher, Am. Inst. Chem. Eng. meeting, Cleveland, May 9-12, 1948) are highly successful. The recovery is 98 per cent and the contamination by methane is only 0.1 per cent.

The process is said to be economically feasible for the removal of (1) hydrogen from methane or heavier gases, (2) ethane from propane or heavier gases, (3) ethylene from cracking-still gas, (4) propane and butane from lean natural gases, and (5) many chemical gases such as acetylene, hydrogen chloride, etc., from their diluent gases.

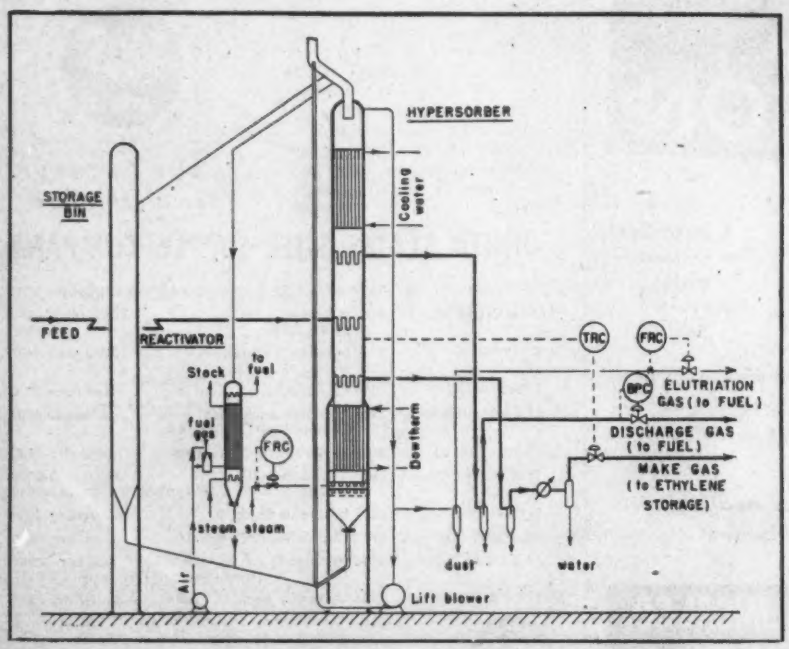

Fig. 1—Simplified flow diagram of hypersorption operations. (Courtesy Chem. Engineering, Reference 3)

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1. Berg & Bradley, Hypersorption Process for Separation of Light Gases, A.I.Ch.E., 42, 665 (1946).

2. Berg & Bradley, Hypersorption—New Fractionating Process, Pet. Engineer, May 1947, p. 115; and Pet. Processing, April 1947, p. 300.

3. Anon., An abstract of a paper by Kehde, Fairfield, Frank & Zahnstecher before the A.I.Ch.E., Cleveland, May 9-12, 1948, published in Chem. Engineering, June 1948, p. 264.

4. Foster Wheeler Corp., Bull. O-48-3 entitled, "Hypersorption," 165 Broadway, New York 6.

Barnacle Growth in Condenser Pits

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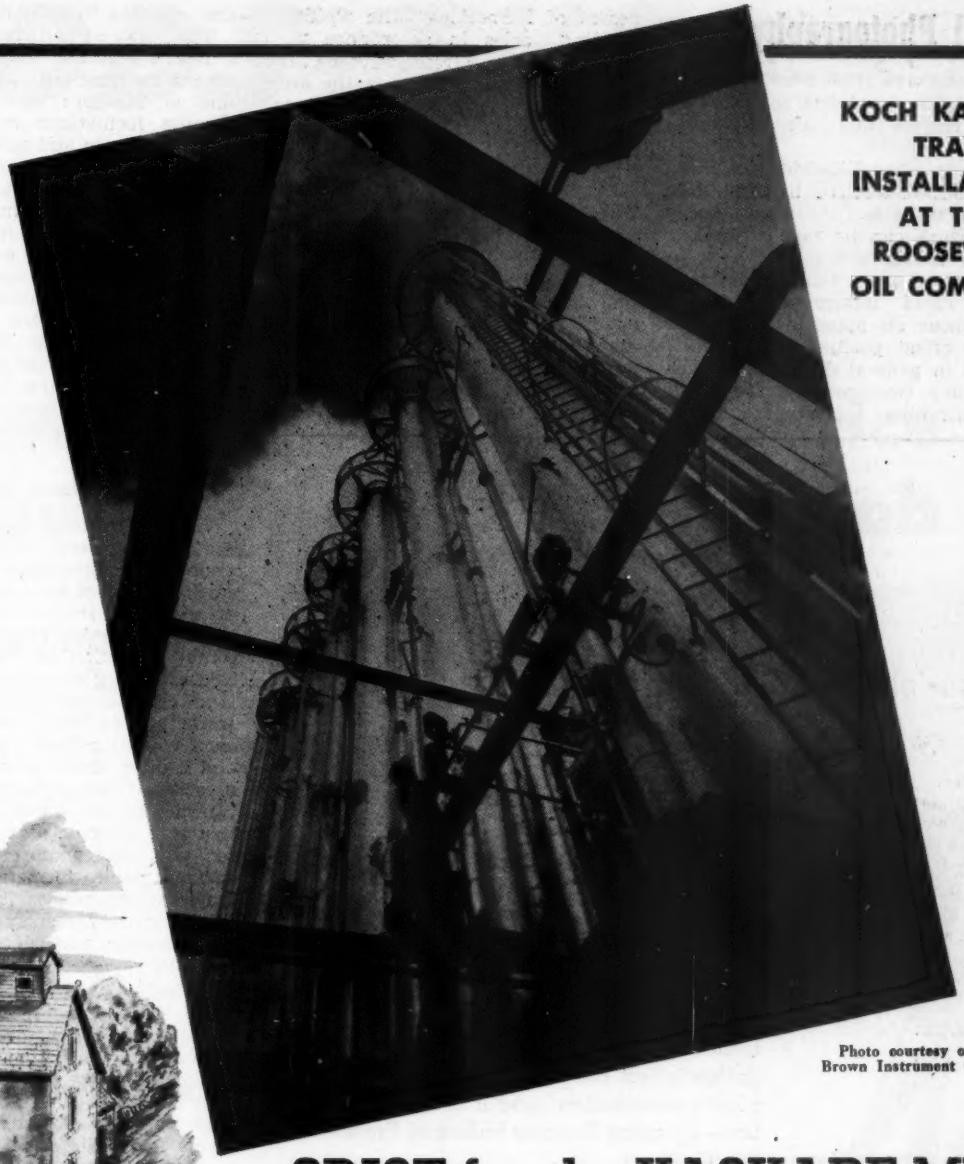
Copper salts have long been known to be deadly to crustacea, mollusca, and barnacles. For many years muntz metal (40 per cent zinc, 60 per cent copper) was used to sheath the bottoms of ocean-going vessels as a protection against barnacle growth. The small amount of copper salts liberated by corrosion of the muntz metal in salt water kept the vessel free from barnacles.

The use of copper sulfate is perhaps the cheapest of killing barnacles. About 5.5 lb. of copper sulfate is used per 1,000 gal. of water, and the solution is applied for about 2½ hours after the solution is thoroughly mixed. No information on the use of continuous small dosages is available.

Barnacles can also be killed by heating the water. A temperature of 120°-145° F. must be attained and the water must be allowed to stand for an hour after it attains temperature. The amount of steam required to go from 50° to 145° F. is about 750 lb. per 1,000 gal. of water. Long times (3 or 4 hours) at 110° F. are also effective.

An excellent discussion of methods is that of R. B. Lee, "Control of Barnacle Growth . . .," Power Generation, May 1948, p. 86.



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Aerial Photography

(Continued from page 100)

guished by its usual dark color, heavy, uneven texture, and lack of bedding planes.

In areas of well-bedded sedimentary rocks, distinctive banding may occur for miles and the most persistent horizons can be labeled as key beds for aid in any future work to be performed in the field. Such bands permit rapid interpretation when they appear on opposite sides of a fold, in offset positions from faulting and in general distribution over the country. Good markers are of aid in determining approximate thicknesses of formations. The width of banding varies in accordance with changes in dip, from wedging and structural configurations in the area.

The thicknesses of horizontal beds or gently dipping strata cannot be estimated by the width of outcrop since undulations and structural warpings may broaden the exposure of a comparatively thin unit for great distances. Outcrops of sloping beds that dip upstream form characteristic "V's" that also point upstream while the opposite is true for beds dipping downstream. An exception to this criterion occurs, however, when a stream channel is steeper than beds dipping in the same direction and in this case the "V's" point upstream.

The strike of beds that are dipping a few degrees or more is approximately the same as the direction of the line of outcrops and with steeply dipping formations the true strike is very definite and obvious on aerial photographs. Determination of strike in gently dipping rocks is made by visualizing the sloping plane and drawing the strike at right angles to the dip. In deeply eroded country, the direction of dip can be seen by observing the same contact on different sides of a stream or ridge. The actual measurement of comparative elevations of three points on the sloping surface by the height finding instrument is the most accurate manner of establishing dip in areas of low relief.

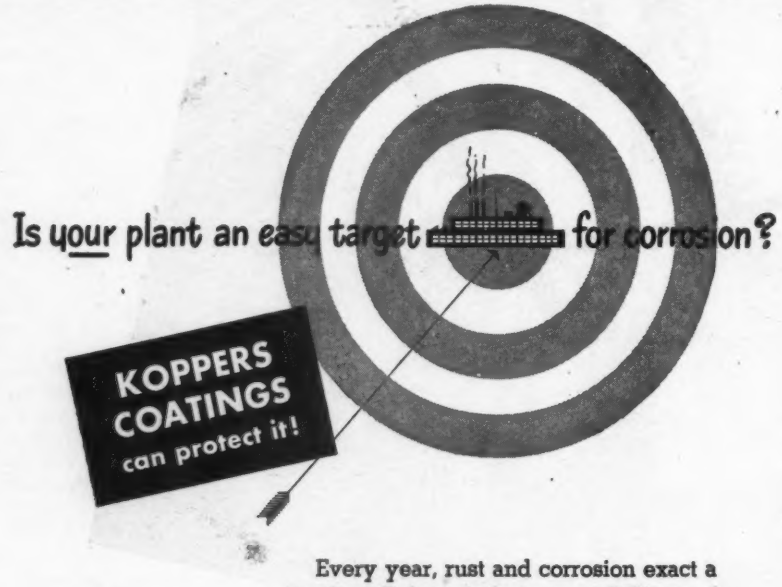
Faults, Fractures, Shear Zones

Faults, fractures, and shear zones are usually very readily identified under the stereoscope, for after an earth movement has occurred, the line of weakness seldom disappears and the zone remains visible or indicates some alteration or mineralization. The offsetting or weaving of a scarp is a common token. A fault trace scarcely ever has a straight course even when the fault plane is vertical and it often shows broad curves with occasional sharp deflections. The view afforded by aerial photographs shows that true geologic planes do not exist for any appreciable distance; fault surfaces and formational contacts may be true planes in local places, but they are presently seen to curve in horizontal, vertical, or oblique directions.

In regions of moderate to high relief, shallow depressions may signify a fault line and often such features are too slight to be noticed or suspected on the ground. Practically all faults have combinations of both vertical and horizontal movements and their effect is discernible in photographs in the discontinuity of outcrops and the offsetting of contacts. Faults are frequently evidenced by sudden strike and dip changes and repetition and omission of beds within short intervals.

The straight courses and alignment of two tributaries flowing toward each other and meeting at a main stream are indicative of faulting or of a fracture zone. Fault-line escarpments are nearly always far more striking on aerial photographs than when seen on the ground. Structural conditions favorable for oil and gas accumulations are frequently controlled by deep-seated faulting. Therefore the discovery of their surface expression is of considerable importance even where surface geology and outcrops are almost nonexistent.

The distinctive fabric pattern of joints is easily recognized and is usually the result of differential erosion along the fracture planes.



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The discontinuity of contacts and beds outcropping at an angle beneath overlying formations, plainly reveals an angular unconformity; vegetation is often observed to be more luxuriant on one side than the other. Thrust faulting is occasionally defined by vegetational preferences, but such outlining by plant lift is also characteristic of flat-lying beds so discretion is necessary in any deductions through photo examination.

In any region where photo geology is to be employed, an advance knowledge and familiarization of geological conditions is of utmost importance in order to gain an insight as to the patterns to anticipate. This information may be available from maps, bulletins, or reports on the area or can be gained from a brief visit to the area. It includes an acquaintance with sedimentary sequences, unconformities, igneous features, faulting, wind, and alluvial deposits and glaciation.

Field examinations upon completion of the photographic interpretation are of great value and usually necessary. The aerial study is only a rapid means of obtaining surface geology and finer points acquired in the field provide a useful supplement to the knowledge of an area. The interpreters of the photographs are most familiar with the topographic and the structural aspects of the particular region and therefore are best equipped to perform the field check.

Each trip in the field brings more confidence to a photogeologist, for he is thus enabled to verify his work and to learn the various distinctions that contribute to rapid and accurate interpretation. The field check confirms important discoveries and is also made to investigate indications of favorable traps, rock exposures on photographs of poor definition, actual measurement of dips and strikes in areas of indistinct stratification, and the presence of dips that may be hidden from view in deep canyons or projecting shelves.

Occasionally dips are observed on all sides of a possible structure except one ond the question of closure on the critical flank must be ascertained. In the stereoscopic tracing of an anticlinal trend, some irregularities and variations from superimposed cross folds and saddles may be seen. The low dips at the terminations of the smaller features often require ground study for substantiation.

Ground View Clarifies Picture

In rare cases, the strike of steeply dipping sedimentary beds forming a hogback may parallel a series of dikes and there will be some uncertainty as to proper identification without a field examination particularly where scale of photographs is small and bedding difficult to recognize. Many geologic formations interfinger and merge into each other so gradually that the actual contact cannot be preceived in photographs, while a ground view quickly clarifies the specific circumstance.

The plotting of field-observed dips and strikes enhances the value of a map containing dips that have been estimated stereoscopically. The photographic limits of dip estimation must necessarily be broad and where lithology is obscure, the exact determination of dip and strike is not achievable. Relief is exaggerated with the magnifying stereoscope to such an extent that the magnitude of dips is very likely to be overestimated and the recognition of this characteristic is important. At the edges of cliffs or bluffs, an optical illusion often creates an impression of dip that either does not exist or is considerably emphasized.

For most parts of the United States, sufficient maps and control are available for construction of a land net upon which the photographic data is traced so that actual land locations are reasonably accurate. In regions that have not been sectionalized or completely surveyed, the accuracy of the composite tracing of the mosaic (upon which all of the individual photographic data has been plotted) and the land control, must rely more upon ground features such as roads, streams, and the general topography. Although proper locations are not as dependable in the latter case, the

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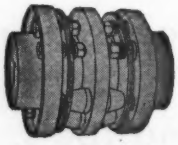
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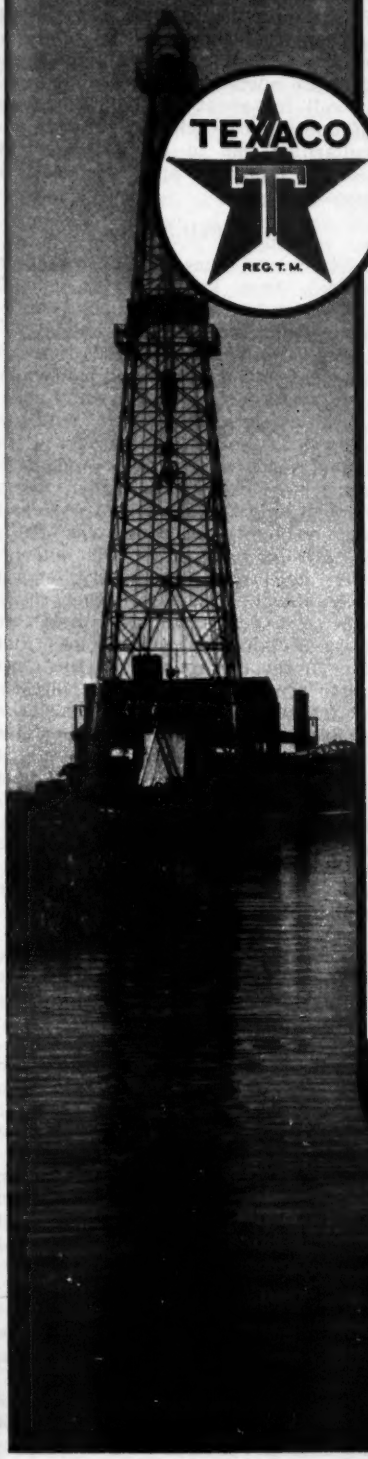


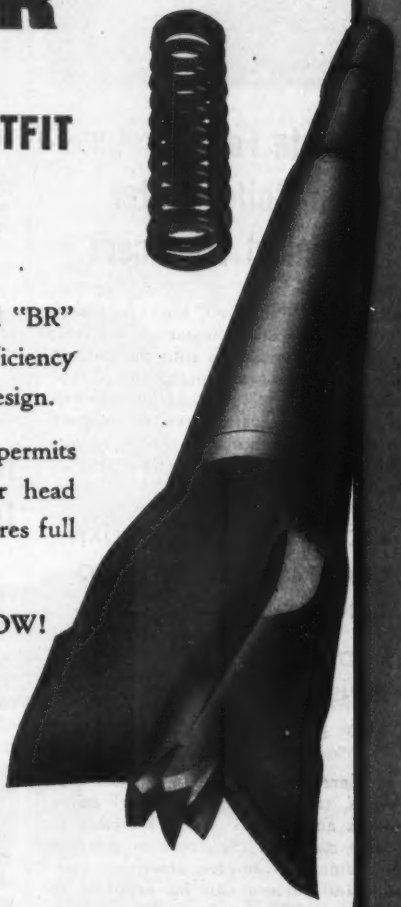
by "TEXACO" and HILLBURN DRILLING COMPANY with the

REED 'BR'

Wire Line

CORING-DRILLING OUTFIT

on the No. 2 Falgout, Golden Meadows, La.



On well after well the Reed "BR" Wire Line has proved the efficiency of its **retractable core cutter** design.

The spring, shown at right, permits retraction of the core cutter head within the drilling bit, and assures full recovery of long, clean cores.

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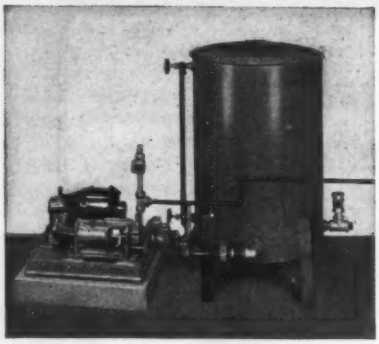

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resulting maps are usually satisfactory for reconnaissance purposes. To save time and expense, complete ground surveys can be made of only the portions of the area containing worthwhile anomalies after examination of the photographs.

A final map of the structural and areal interpretation should show in a reconnaissance manner all the information that would be gained in a much longer period of time by surface study. This includes all detail observed under the stereoscope, the dips and strikes, lines of folding, synclinal axes, faults, dikes, principal outcrops, areal geology, igneous rock and sufficient streams, roads, and cultural features along with the land net to permit rapid checking and appraisal of the survey. Where considerable detail occurs, the preparation of one map for geology only and another for all other information may be preferred.

The connecting of strike positions by lines gives a generalization of the regional dip and localizes points of interest. This is good practice as long as the purpose is clearly understood. Such lines are not contours and do not represent elevations, but are merely an aid to the structural picture. Outcrop bands are easily differentiated by cross hatching, pattern drawing, or by marking the bands in distinctive colors.

New Developments In Drilling Fluids

(Continued from page 101)

control. This has been extremely helpful when combating high-pressure salt-water flows. A lime red mud might be thought of as ordinary drilling mud to which is added approximately 3 lb. per barrel of each of caustic, quebracho, and lime. The proportion of these three ingredients may be varied considerably at times, depending upon the individual mud as we have found that control of such things as alkalinity has a bearing upon the tolerance of such muds for salt and other contamination. The water loss of the lime red muds can be lowered to most any desired figure by the addition of starch or carboxymethyl cellulose.

The lime red muds have played a major part in reducing mud costs in the type of drilling operations which were normally considered very expensive. They can also cut down greatly upon the amount of rig time which might be lost in conditioning mud as they are considerably more stable. In general, they allow deep-drilling operations to progress with a minimum amount of mud troubles. It should be pointed out that a mud of this type does not tend to disintegrate the formation drilled as readily as some other types of mud, and this may result in the cuttings tending to ball up on the drill collars or sides of the hole. It is recommended that while drilling with this type of mud, the pipe be worked at regular intervals so as to prevent any accumulation of balled cuttings which if neglected could result in sticking of the drill pipe.

There are several other types of complex organic compounds which have recently been developed as substitutes for quebracho. These materials have a behavior somewhat different from that of quebracho but it appears that they may be used for many of the purposes for which we now use quebracho and they currently sell for about one-half the price of quebracho. Each has its own peculiarities but in general may be used in lime-type muds such as discussed above.

Valuable Salt-Section Mud

Starch and other gelatinous organic colloids have been used to control the water loss of muds under conditions which normally flocculate colloidal clays. We are now able to make very satisfactory saturated salt-water mud, using salt-water clays and drilling-mud starch. This type of mud has proved extremely valuable for drilling through salt sections and it is satisfactory for drilling where there is open hole and shale above the salt such as might be expected when drilling salt overhangs, etc.

As mentioned previously, starch may also be added to other muds when it is desired to lower the water loss. The drilling-mud starches that are on the market are for the most part pregeletanized corn starches. Starch when used in mud must be protected against fermentation. This may be accomplished by having the mud saturated with salt, carrying a pH above 12.0 or by the addition of preservatives such as formaldehyde, sodium pentachlorophenate, etc. It is most common to use starch in a high-pH mud, or if salt formation is to be drilled to use it in a saturated salt-water mud.

Recently, carboxymethyl cellulose has been used for controlling the water loss of muds. In general, its use is quite similar to that of starch; however, it does not need to be protected against fermentation which has made it a very valuable tool in certain types of mud. C.M.C. sells for approximately five times the price of starch, but it usually takes considerably smaller quantities. In certain muds it is cheaper to use C.M.C. than starch because of the expense of maintaining a high pH or other means of protecting the starch against fermentation.

The organic colloids are very useful tools as they provide a positive means of controlling the water loss, regardless of contamination.

Oil and oil-base drilling fluids have been thought of for many years as a drilling fluid; however, it is only re-

cently that they have proved practical as a drilling mud. Some very outstanding results have been reported with oil muds where it has been possible to drill certain formations and complete very good wells, whereas when drilled with conventional water-base muds these formations produced very little or nothing. Oil muds prevent the wetting of shales and other formations drilled and they prevent water blocking or sealing off oil-producing zones. Straight oil mud is essentially a mixture of a high-flash diesel oil, oxidized asphalt, and a soap formed in the mixture. The purpose of the asphalt is to impart sealing properties and the soap imparts viscosity and gel-strength control. These muds are rather expensive in first cost, but often it is possible to use the same mud on a number of operations. Due to difficulties with completions and peculiarities of certain formations, the cost of oil mud is often more than justified.

Recently, oil has been emulsified in ordinary water-base drilling mud forming what is known as oil-emulsion muds. These muds seem to give results that approach that attained with straight oil muds in some cases. Emulsion muds are not expensive and they have the appearance and behavior of an ordinary water mud. In some areas, emulsion mud has eliminated drilling problems such as sloughing shale and tight hole. It has also speeded up the drilling rate when drilling in certain formations. The principal reason that oil emulsion muds have been used, according to reports, is to get better wells which come in much easier and at higher rates of production. Emulsion muds may be an increasingly useful tool in the future because their lubricating properties increase the life of bits, making fewer trips necessary, reduce circulating pressure as much as 25 per cent, and reduce rotating torque considerably. As drilling goes deeper these factors may become increasingly important. Oil-emulsion mud is essentially a good water-base mud to which is added approximately 20 per cent by volume of a high-flash diesel oil containing an emulsifying and stabilizing agent. The control of emulsion muds is by chemical treatment very similar to that of ordinary water muds.

Silicate Plug Used by Gulf

Lost returns are one of our most expensive and hazardous mud problems. The type of openings in the formation in which mud is lost is so variable it is difficult to think of any one approach to this problem. Our company has done work with what is called a silicate plug, and interesting results have been obtained. The silicate plug consists of mixing a high-ratio silicate of soda and a fresh-water mud made from clays and treated with deflocculating

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agents so as to obtain a pumpable viscosity with a rather high solids content. It is desired to mix the silicate and this thick clay slurry in place, which results in a rubbery gel being formed which serves as the plugging agent for the porous formation. When conditions permit, it is desirable to pump down 100 bbl. of thick clay mud and follow this with about 5 bbl. of silicate. If the point of loss is known, the water mud would be pumped out of drill pipe and up in the annulus. As the silicate which follows this slug reaches the bottom of the pipe, the well is closed in and the thick clay mud pumped down the annulus by pumping into the casing and the silicate pumped out of the drill pipe so that the two will mix at the bit as they are squeezed into the porous formation.

Heaving-Shale Zones

Recently we have found that we can thicken the same type of a thick clay mud by mixing it with a high-pH red mud. Aside from the silicate-plug method which is suitable for rather extreme cases of lost returns, improvements have been made in the addition to mud of fibrous and flake materials, which depends on the large solids being strained out and building a mat on which the drilling mud will build an impervious cake. We have had considerable success using batch treatments containing about 7 lb. per barrel of cellophane flakes and about 23 lb. per barrel of mica. It is usual that 100 to 150 bbl. of such mud be mixed and pumped into the hole in order to plug off the point of loss.

Heaving shale has long been a barrier to deep drilling, particularly in the Gulf Coast area. During recent years our company has made use of silicate-brine muds in drilling heaving-shale zones and we have been able to obtain the objectives desired by our geological department. Silicate-brine muds have a liquid phase containing a rather high content of silicate of soda and salt. The purpose of this mud is to prevent the hydrous disintegration and swelling of soft colloidal shales found in heaving-shale zones. When drilling with this type of mud the cuttings do not dissolve and they are carried to the surface as bit-marked shavings just as they are cut by the bit and are removed by the shaker screen. Our experience indicates that by using a mud of the silicate-brine type which prevents the disintegration of the shale, and by carrying adequate weight to balance the abnormally high pressures of gas and salt water normally found in heaving-shale zones, these troublesome areas can be drilled without difficulties. Although this is not a new development, it is the only drilling fluid, at present, with which we can drill through heaving shale.

ENGINEERING fundamentals

Productivity Index

IT is desirable to be able to assign to a producing well a quantity which indicates its ability to produce or which gives some indication of its longevity. In the early days of proration where such a quantity was desired, the well potential was a commonplace measurement. This potential was a measure of the well's capacity to produce under wide-open flow. The productivity index has taken the place of such a potential measurement and presumably gives the same information.

By definition, **productivity index** is equal to the barrels per day of stock-tank oil production per pound of pressure differential between the well bore opposite the producing horizon and the static reservoir pressure, which is presumably the pressure at the well's radius of drainage. According to accepted concepts of flow, the rate of flow in a system containing a single fluid under steady state conditions should be directly proportional to the pressure drop. Therefore, it was anticipated that the productivity index would be the slope of the straight line resulting from plotting rate of flow against pressure drop. On such a plot the wide-open-flow quantity or well potential would be measured at the maximum pressure drop obtainable. Such an ideal case is shown in Fig. 1.

The first attempts at explaining or correlating productivity index, therefore, were on the basis of Darcy's Law. For a radial system, steady state, the equation giving the relationship between variables is:

$$Q = \frac{7.07\,k\,h\,(P_e - P_w)}{\mu \quad \ln \quad R_e/R_w} \qquad (1)$$

Therefore, the term equivalent to productivity index is:

$$P.I. = \frac{Q}{\Delta P} = \frac{7.07\,k\,h}{\mu \ln R_e/R_w} \qquad (2)$$

This elementary analysis indicates that the productivity index should be a function of the formation characteristic, k, the fluid characteristic, μ, and the system characteristics, h, R_e and R_w.

The term **specific productivity index** is frequently used and means usually the productivity index per foot of pay. In other words it is made specific by eliminating one of the variables of the system. The productivity index could just as well be made specific to any other of the variables on the right side of Equation 2.

Of course, well systems do not operate under steady state conditions nor with a single fluid flowing. Therefore Equation 2 cannot be expected to yield exact correlation. Early attempts at correlation were by this equation with factors introduced to consider the departure of k from the air value to the relative permeability value, to account for the shrinkage of the oil between the reservoir and the stock tank, and to account for variations in reservoir oil viscosity and in drainage areas. The primary correlation sought has been that with permeability in order that productivity index values could be predicted from core analysis. One such early correlation is given by Fig. 2.

Observed values of production rates and the pressure differentials do not give ideal straight lines as shown in Fig. 1. It is quite common to obtain a curved line as shown by Fig. 3. This is a result of the fact that the well system is not under steady state flow nor is it completely filled with liquid. It may also result from the fact that relatively short intervals of time are consumed in taking such measurements and the pressure differentials measured are not always effective back to the same value of R_e in the well system. Productivity-index data on older wells are usually linear more often than data taken on flowing wells.

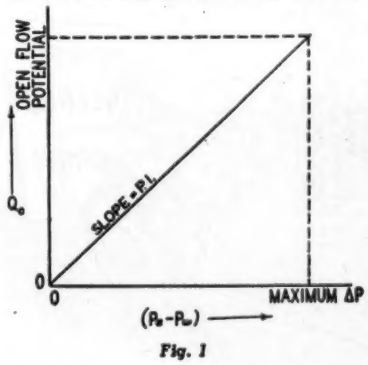


Fig. 1

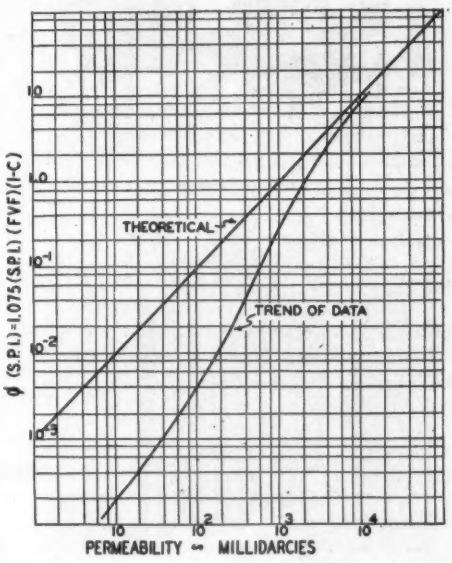


Fig. 2

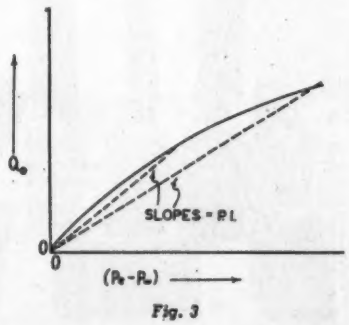
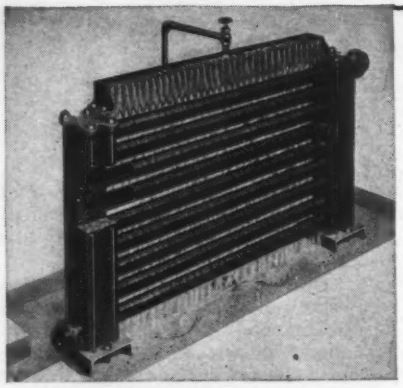
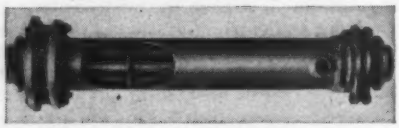


Fig. 3

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma



"Karbate" Sectional Cascade Cooler



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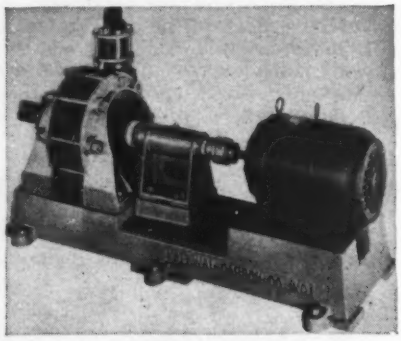

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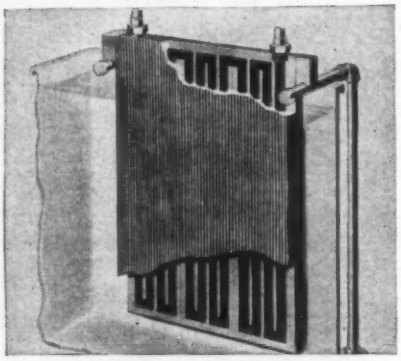
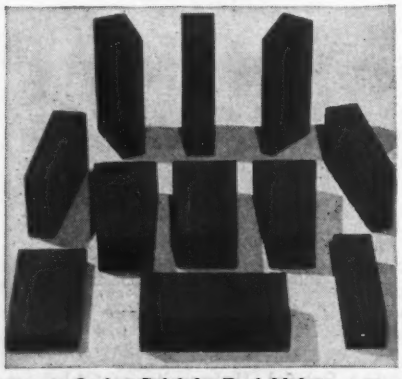


"Karbate" Plate Heater



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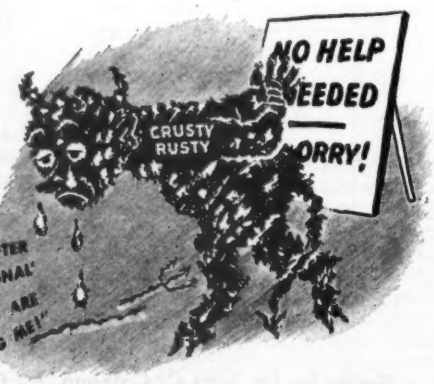
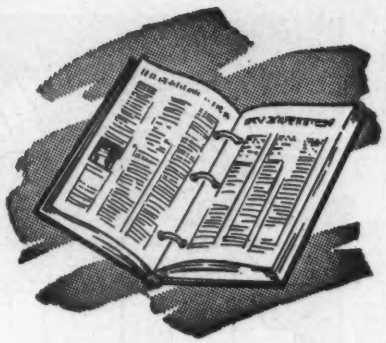


The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Velocity Head

PRESSURE DROP IN REFINERY LINES

The pressure drops and capacities of tubes and pipes has been discussed in many issues of the Refiner's Notebook. The special situations of friction loss, hydraulics, or pipe capacity that have already been discussed are:

No. 18—Nov. 18, 1944, p. 147—Vent Lines—Vapor Handling
No. 59—Sept. 15, 1945, p. 119—Tower Hydraulics
No. 97—June 15, 1946, p. 137—Pressure Drop Through Tube Side (of Exchangers)
No. 98—June 22, 1946, p. 129—Pressure Drop Through Tube Bundle of Exchanger
No. 99—June 29, 1946, p. 127—Fin-Tube Exchanger Units
No. 109—Sept. 7, 1946, p. 107—Return Bends (equivalent lengths)
No. 132—Feb. 22, 1947, p. 171—Transfer-Line Pressure Drop
No. 155—Aug. 2, 1947, p. 93—Suction Lift of Pumps
No. 163—Sept. 27, 1947, p. 111—Velocity and Pipe Size
No. 166—Oct. 18, 1947, p. 153—Sizing of Refinery Oil Lines
No. 171—Nov. 22, 1947, p. 93—Sizing of Water and Steam Lines
No. 176—Dec. 27, 1947, p. 285—Equivalent Length in Feet Caused by Various Fittings and Restrictions
No. 180—Jan. 22, 1948, p. 103—Steam Flow Through Orifices
No. 186—March 4, 1948, p. 97—Pressure Drop in Vapor Lines
No. 187—March 11, 1948, p. 115—Pressure Drop—Coil-in-Box Condensers
No. 189—March 25, 1948, p. 207—Friction Loss—Condenser Tubes
No. 190—April 1, 1948, p. 281—Friction in Pipe Coils or Bends
No. 206—July 22, 1948—Friction Factors
No. 207—July 29, 1948—Pressure Drops—150° F.
No. 208—Aug. 5, 1948—Pressure Drops—80° F.
No. 209—Aug. 12, 1948—Pressure Drops—300° F.
No. 210—Aug. 19, 1948—Tower Pressure Drops

ENERGY is required whenever velocity is imparted to a fluid and this energy is called velocity head. In certain equipments such as venturi tubes or ejectors, part of this energy is recovered, but ordinarily the velocity head is wasted as the fluid strikes a container wall or as it mixes into the main body of fluid. This pressure loss (velocity head) may be expressed as:

$$\Delta P = 0.000673\ su^2$$

in which ΔP is psi., "s" is specific gravity of the fluid, and "u" is the velocity in feet per second. Table 1 shows the value of velocity-head losses for common refinery liquids.

The pressure required for flow in a piping system consists of four major items:

1. **Pressure head.**—This may consist of an increase in elevation (feet times density lb. per cu. ft. ÷ 144 = pump pressure, psi.) or it may be the pressure maintained in the vessel into which the fluid is being pumped. This item may be negative.

2. **Line friction.** — The several Refiner's Notebooks shown in the box on this page indicate some line friction situations, particularly Notebooks 207, 208, and 209 which pertain to oil flowing in lines. Fittings, constrictions, etc., are treated as the equivalent of more pipe length (Notebook 176, Dec. 27, 1947).

3. **Velocity head.**—This page.

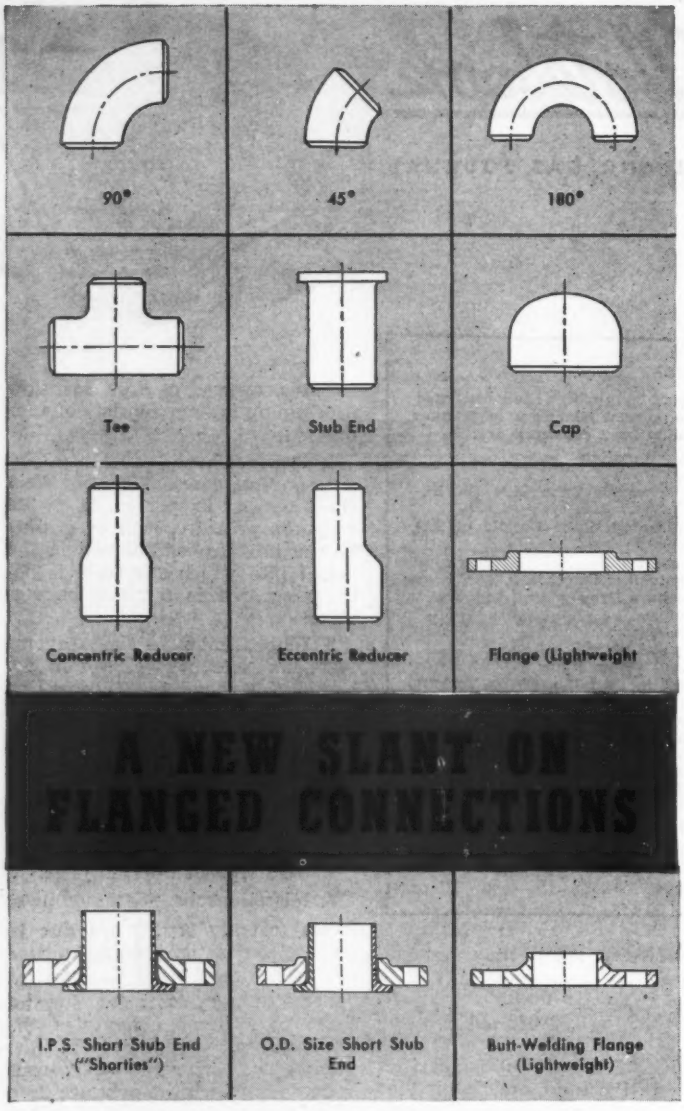
4. **Miscellaneous.**—Some of these losses (usually small) are due to meters, contractions, enlargements, etc.

For liquid systems the sum of these four items constitutes the total pressure required at the pump. The behavior of gaseous systems in which the pressure drop is so large that appreciable expansion takes place is too complicated to discuss here.

TABLE 1—VELOCITY HEAD LOSSES, PSI.

	2-in. pipe			3-in. pipe			4-in. pipe			6-in. pipe		
Rate of flow, g.p.m.	S=1.0 Water Cracked fuel at 100° F.	S=0.8 Kero. at 60° Lube at 350° Asphalt at 700°	S=0.6 Isopentane at 60° Gasoline at 325° Kerosine at 475° G. oil at 650°	S=1.0	S=0.8	S=0.6	S=1.0	S=0.8	S=0.6	S=1.0	S=0.8	S=0.6
60	0.25	0.20	0.15	....	....	....	....	....	....	....	....	....
70	0.34	0.27	0.15	....	....	....	....	....	....	....	....	....
80	0.45	0.36	0.27	....	....	....	....	....	....	....	....	....
90	0.57	0.46	0.34	....	....	....	....	....	....	....	....	....
100	0.70	0.56	0.42	....	....	....	....	....	....	....	....	....
120	1.01	0.81	0.60	0.20	0.16	0.12	....	....	....	....	....	....
160	1.79	1.43	1.07	0.35	0.28	0.22	....	....	....	....	....	....
200	2.80	2.24	1.68	0.55	0.44	0.33	0.18	0.14	0.11	....	....	....
240	4.03	3.23	2.42	0.80	0.64	0.48	0.25	0.20	0.15	....	....	....
300	....	....	....	1.25	1.00	0.75	0.40	0.32	0.24	0.08	0.06	0.05
400	....	....	....	2.21	1.77	1.32	0.70	0.56	0.42	0.14	0.11	0.08
500	....	....	....	3.46	2.77	2.08	1.10	0.88	0.66	0.22	0.18	0.13
600	....	....	....	4.96	3.97	2.98	1.58	1.27	0.95	0.31	0.25	0.19
700	....	....	....	....	....	....	2.15	1.72	1.29	0.43	0.34	0.26
800	....	....	....	....	....	....	2.80	2.24	1.68	0.55	0.44	0.33
1,000	....	....	....	....	....	....	4.38	3.50	2.62	0.86	0.69	0.52
1,200	....	....	....	....	....	....	....	....	....	1.25	1.00	0.75
1,400	....	....	....	....	....	....	....	....	....	1.69	1.35	1.01
2,000	....	....	....	....	....	....	....	....	....	3.45	2.76	2.07

No. 211 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



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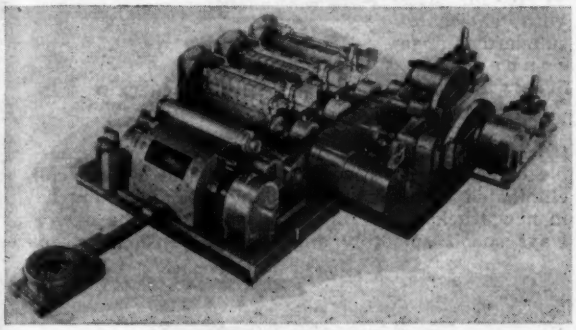
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by John M. Spears

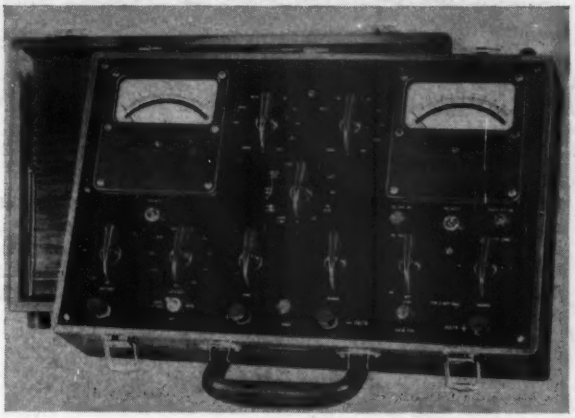
(1) NEW CONSOLIDATED DRILLING RIG includes three Superior PTDS-8 turbo-supercharged, dual-fuel diesels and two Type E-700 Ideal power slush pumps. Rig is conservatively rated for 16,000 ft. drilling with 5-in. o.d. drill pipe. An operating feature of rig is the



air-operated valves which control the principal operations of the rig. Draw works has a spooling drum 36 in. in diameter and 61¼ in. long, and grooved for 1½-in. wire line. Water-cooled brake rims for the drum are 62 in. in diameter and 10⅜ in. wide. Air-operated compound equalizing brakes are used, and 42 and 36-in. air-operated friction clutches are provided for the low and high-drum drives respectively. Air-operated friction-type catheads have been incorporated as built-in equipment. Six hoisting speeds are provided through the three-speed, air-clutches transmission on the No. 1 engine sectional frame in combination with the high and low-drum drive clutches. *National Supply Co.*

IT'S NEW CHECK IT

(2) MULTICOMBINATION METER, for electrolysis and corrosion investigations and cathodic-protection testing both in field and laboratory, provides all of the instrumentation required to cover the wide range of d.c. current and potential measurements necessary in this field. By use of a circuit selector switch, a high-sensitivity, 300 ohms-per-volt millivolt voltmeter covering ranges of 2 mv. to 100 volts, full scale, and a high-sensitivity, 62,500 ohms-per-volt voltmeter with ranges of 100 mv. to 20 volts full scale, are provided. Either may be used separately or both may be used simultaneously. Also provided are a potentiometer-voltmeter with a high-resistance calibrated galvonometer; a vacuum-tube voltmeter which is fully battery operated with ranges from 100 mv. to 10 volts with 500,000 ohms input resistance;



a milliammeter and ammeter with full scale ranges of 1 ma. to 20 amp.; and a zero-resistance type ammeter with capacity up to 2 amp. from self-contained batteries and controls. Either the direct reading milliammeter or ammeter or the zero-resistance type of ammeter may be used independently or simultaneously with the high-resistance voltmeter or the vacuum-tube voltmeter. A d.c. biasing potential is provided to "back to zero" a galvanic potential—to provide for measuring a change in potential directly on the calibrated galvanometer, high-resistance voltmeter, or the vacuum-tube voltmeter. Polarity reversing switches are included for each instrument. *M. C. Miller.*

IT'S NEW CHECK IT

(3) HEAVY-DUTY STEAM GENERATOR-CLEANER effectively cuts paraffin, low-melt asphalts, and sludges. Unit produces up to 150 lb. of pressure at 300° to 400° F., and steam penetrates several hundred feet into the hole where paraffin clogging is most prevalent. Device has also been tested extensively with good results in cleaning flow and lead lines, tubing, storage tanks, and

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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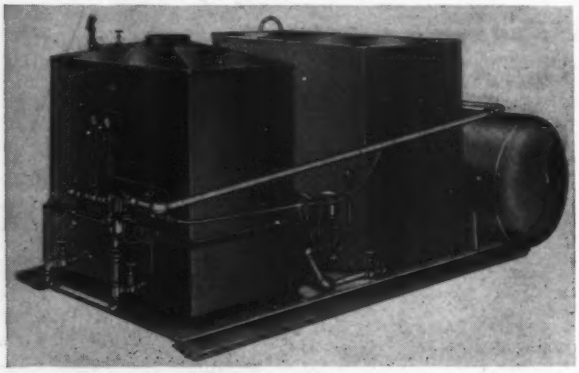
various containers. Low-melt asphalts and sludges respond to the unit's high-pressure steam at 300°-400° temperature levels, depending upon chemical content and melting point of the substances encountered. Generator-cleaner is equipped with butane heating element al-



though natural gas may be used. It has a heavy-weight, double steel shell with thick asbestos lining. It is equipped with thermostat, 200-lb. pop valve, and automatic pressure-stat, plus 300-lb.-test steel connections. The unit is 5 by 5 by 5 ft., weighs 2,500 lb., and is skid mounted. *Ewing Manufacturing Co.*

IT'S NEW CHECK IT

(4) SARAN-LINED PIPE AND FITTINGS offer excellent chemical resistance for the handling of highly corrosive liquids. New method of fabrication is an improvement to overcome supporting and low-temperature problems, which are sometimes encountered with regular

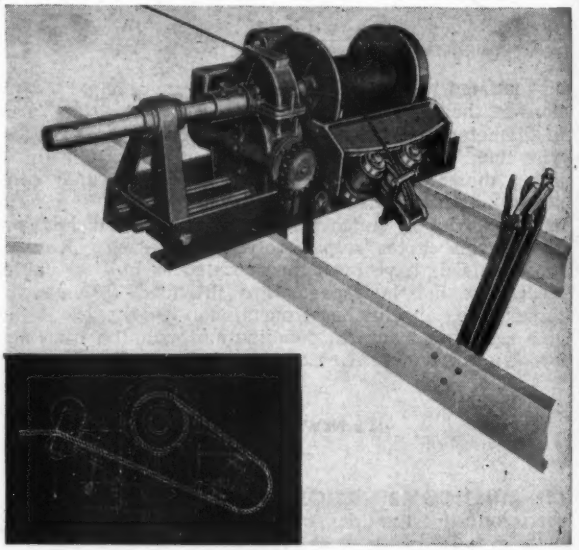
saran-pipe and fittings. This practical thermosplastic-lined pipe serves in a vast variety of applications. Saran-lined steel pipe has excellent chemical resistance to most of the organic and inorganic materials. For general service the pipe and fittings can be used at temperatures between 0° and 180° F. *Saran Lined Pipe Co.*

IT'S NEW CHECK IT

(5) POSITIVE SHUTOFF VALVE handles hot acids, strong or highly corrosive solutions, hydrocarbons, and other penetrative fluids despite corrosive action or deposits on the valve parts. Many unique features include a self-cleaning action, multiple-seat design, and injection sealing for emergency conditions. Available in ½ to 10-in. sizes with choice of standard flange connections. *Sellers Injection Corp.*

IT'S NEW CHECK IT

(6) REEL-RITE TRUCK WINCH. Costly, dangerous cable damage or breakage from loose and crossed coils is eliminated by automatic spooling and tensioning device in new truck winch. Spooling and tensioning device always spools smoothly and tightly. Tensioning sheaves

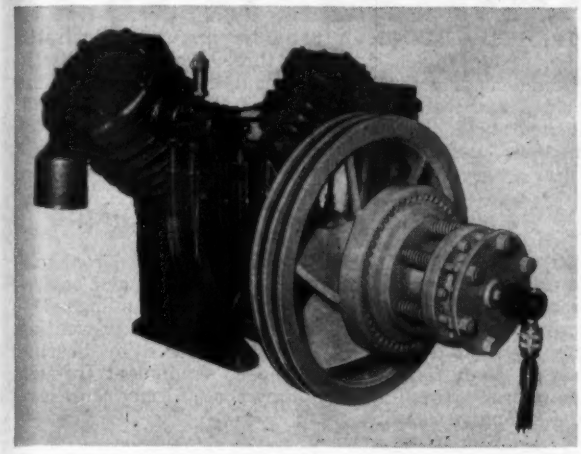


apply proper tension even when the cable is slack. As a result, cable is laid on in smooth, even, closely coiled layers. There is no bunching or piling of coils—no crushing of rope, and no cutting and breaking of strands due to uneven winding. Spooling unit is not mechanically linked to the winch drive so it automatically compensates for any change in rope diameter, stretch, speed, or wear. Reeving diagram, lower left, shows how line from load passes through automatic tension device to automatic spooling unit to drum. *Gar Wood Industries, Inc.*

IT'S NEW CHECK IT

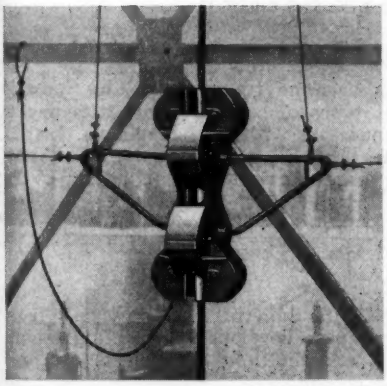
(7) AIR-COMPRESSOR CLUTCH, completely automatic, reaches a new high in efficiency, requiring no attention from operator, starting and stopping at any desired

maximum and minimum pressure. Intended for heavy-duty use, it has six strong springs to provide simple, positive, automatic engagement. Air pressure acts on a diaphragm, when pressure operates the unloader, to



disengage the clutch. Air-compressor clutch is easily accessible at all times and may be mounted with the air compressor at the outer end of the power-unit output shaft and is driven by a V-belt pulley on the output shaft. Friction lining wears up to a full ¼ in. before any replacement is necessary. *Wichita Falls Foundry & Machine Co.*

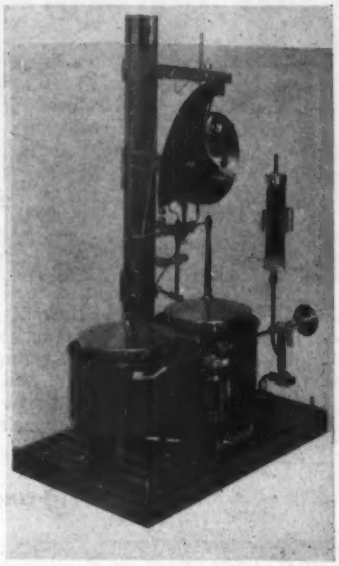
IT'S NEW CHECK IT



(8) NEW WIRE-LINE GUIDE properly stabilizes wire lines due to the greater over-all length and the large number of rollers. Uneven spooling and piling up on the drum is completely eliminated. "Roliguide" handles both dry and lubricated lines. Each of the eight rollers rotates on two races of grease-packed, over-capacity ball bearings. They absorb the vibration and whip of the wire line and transmit a greater portion of it to the guide body and the hanging assembly. Rollers are covered with tough, wear-resistant rubber and are completely housed within the body so that no oil can be thrown out on the crew or rig. Replacement parts are quickly and easily installed. *Patterson-Ballagh Division, Byron Jackson Co.*

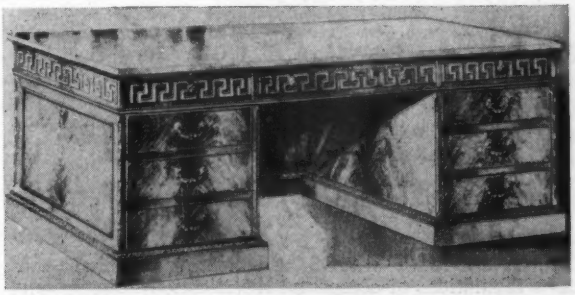
IT'S NEW CHECK IT

(9) DRY-AIR GAS GRAVITOMETER determines and records the specific gravity of gases automatically corrected to the humidity content of air. This double column precision instrument is built to conform to the recommendations of the National Bureau of Standards. It measures the difference in weight between a column of gas and an equal column of dry air—the ratio representing the true specific gravity of the sample. In operation, one bell of the instrument is filled with the gas sample which is being measured, and the other bell is filled with dry air. Tell-tale silica gel is used as a drier in the dry air column. The difference in weight between the two columns acts on the head of the "working bell," raising or depressing it as the gas is heavier or lighter than the air. This force is resisted by the weight of a pendulum which moves, and allows the pen mechanism to move, in direct ratio to the specific gravity of the gas sample. *American Recording Chart Co.*



IT'S NEW CHECK IT

(10) CUSTOM-BUILT DESKS for the home or office are made to individual measure and order. These desks are finished in walnut, mahogany, oak, school brown, blond, bleached mahogany, maple, platinum, and cinnamon. Desk illustrated is a Chippendale with mahogany exterior wood. Features are permo-weld construction, crotch-veneer panels, heart-veneer top, and carved corner beads and base. Hardware is cast brass. English antique finish. *S. Nemes.*



IT'S NEW CHECK IT

TRADE LITERATURE

(11) OIL-FIELD ENGINES. New six-page foldout bulletin describes and illustrates industrial engines for oil-field use. Advantages of unit construction, condensed specifications, and descriptive drawings included. *Hall-Scott Motor Division, ACF-Brill Motors Co.*

IT'S NEW CHECK IT

(12) PETROLEUM-INDUSTRY EQUIPMENT. Richly bound 148-page catalog includes complete descriptions and prices on all WECO, Chicksan, and Okadee products. Catalog includes a 28-page section on WECO products, a 50-page section on Chicksan products, and a 60-page section on Okadee valves. *Well Equipment Mfg. Corp.*

IT'S NEW CHECK IT

(13) "WHO WE ARE, WHAT WE MAKE, HOW WE OPERATE" is the title of new 48-page pocket-size booklet listing the 13 operating companies of Dresser Industries, Inc. Products and services of each are identified. Action shots of equipment at work in oil, gas, chemical, and other industrial fields are included. *Dresser Industries, Inc.*

IT'S NEW CHECK IT

(14) DIAMYL PHENOL. New 24-page booklet describes the properties, uses, and reactions of Diamyl Phenol. Bulletin gives information of value to the research chemist, the plant production man, and the purchasing agent. Uses include production of additives for lubricating oils, plasticizers, and other chemicals. *Koppers Co., Inc., Chemical Division.*

IT'S NEW CHECK IT

(15) VALVES. New 80-page catalog gives complete, concise information on comprehensive line of corrosion-resisting stainless steel valves, fittings, and accessories. Handy tab-indexing system enables the busy engineer or purchasing agent to obtain information on prices, dimensions, finished weights, etc., by a mere flick of the finger. *Cooper Alloy Foundry Co.*

IT'S NEW CHECK IT

(16) PORTABLE POWER AND LIGHT. How electricity is made available anywhere with portable electric generating plants that can be carried, wheeled, or trucked to the job is shown in a new two-color folder. *D. W. Onan & Sons, Inc.*

IT'S NEW CHECK IT

(17) HYDRAULIC RINGS. Engineering manual contains tabulations of compound specifications, dimensional standards, and data on application installations, plus drawings showing typical problems of "O" ring usage. *Crane Packing Co.*

IT'S NEW CHECK IT

(18) CENTRIFUGAL PUMPS. New bulletin punched for ring binding describes and illustrates centrifugal pumps for belt, multi-V-drive, or motor drive. Applications include pumping hot or cold water, brine, light oils, and similar liquids. *Worthington Pump & Machinery Corp.*

IT'S NEW CHECK IT

(19) HELIWELDING. A two-color profusely illustrated eight-page folder describes three types of Heliweld equipment. These are the manual holder, the machine holder, and the electronically controlled automatic head. Photographic illustrations accompany material. *Air Reduction Sales Co.*

IT'S NEW CHECK IT

(20) RELIEF FROM BEARING-WEAR GRIEF. New booklet reveals a new answer to some old problems of power-transmission loss and prematurely worn couplings. Describes the function of flexible couplings in preventing the destructive waste of downtime caused by bearing failure, shaft failure, and damaged equipment through the improper coupling of rotating shafts. *American Flexible Coupling Co.*

IT'S NEW CHECK IT

(21) GEAR MOTORS. New 16-page illustrated catalog covers double and triple reduction units with integrally mounted electric motor in standard sizes of 1 to 30 hp. with an output speed range of 280 to 6 r.p.m. Catalog tabulates various sizes of gearmotors available; gives dimensions and average weights; shows styles of mountings; includes load-classification and selection tables; and gives dimensions of slide rails. *Link-Belt Co.*

IT'S NEW CHECK IT

(22) REFINERY PACKING. New chart for refineries and gasoline plants lists the types of packing recommended for various types of service. Chart lists packings for use in connection with acid, ammonia, brine, caustic, oil distillates, hot oil, propane and butane, hot water, and cold water. *Mechanical Goods Division, U. S. Rubber Co.*

IT'S NEW CHECK IT

(23) TUBE EXPANDERS. Bulletin illustrates and lists adjustable tube expanders developed for rolling small tubes in thin, thick, and multiple tube sheets of condensers, coolers, air conditioners, heat exchangers, and similar units. *Gustav Wiedeke Co.*

IT'S NEW CHECK IT

(24) PRESSURE GAGES. Improvements in Bourbon tube design and gage movement which increase the working range of manufacturer's pressure gages are featured in new catalog. Gages are for pressures above 10,000 psi. *Heise Bourbon Tube Co., Inc.*

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PIPE LINES

T. G. T. Company Rapidly Expanding Gas Delivery

HOUSTON.—Tennessee Gas Transmission Co. expects that the volume of gas being delivered through its rapidly expanding system from Texas to West Virginia will reach 600,000,000 cu. ft. daily this year and will show additional increases in 1949 as more construction is completed.

Gardiner Symonds, T.G.T. president, reviewed company operations in a recent letter to stockholders reporting second-quarter earnings. Natural gas delivered through the system for the second quarter of 1948 averaged 375,000,000 cu. ft. daily, an increase of 7 per cent over the 351,000,000 cu. ft. daily moved the first quarter of this year.

T.G.T. recently completed a deal with Trans-Arabian Pipe Line Co. to take pipe originally slated for the Arabian line and pay Trans-Arabian back later from its mill deliveries. This is allowing the company to finish the second parallel line. Tennessee Gas now has confirmed orders with steel mills for substantially enough pipe to install the third parallel line and extend service to Buffalo.

Symonds said the company expects Federal Power Commission approval in the near future of T.G.T.'s application to lay the third line, including the extension to Buffalo, N. Y., which will give the company a capacity of 1,000,000,000 cu. ft. daily. He also said that natural gas will soon be going to the atomic-energy plant at Oak Ridge, Tenn., if FPC approves. The Atomic Energy Commission has requested 60,000,000 cu. ft. daily from T.G.T.'s system for its operations at Oak Ridge.

The company currently has 10 spreads operating in the field, nine of which are engaged in construction of 450 miles of loops of 24, 26, 30, and 31-in. diameters.

These looping spreads include the following: Oklahoma Contracting Co. has two main-line spreads in West Virginia and is also laying three river crossings; Anderson Brothers Corp. has two spreads in Eastern Kentucky; Morrison Brothers Construction Co. has a spread in Eastern Tennessee; H. C. Price Co. has been completing a loop in Mississippi with a spread which is moving to another T.G.T. loop in Louisiana; H. C. Price Co. has a spread working from El Campo, Tex., and a Bechtel Corp. spread is working from Jasper, Tex.; and Tennessee Gas is completing work in Louisiana with a spread of its own.

Sheppard Construction Co. has a spread in the Rio Grande Valley laying approximately 16 miles of 6 in.

In connection with this program of expansion Tennessee Gas is adding compressor units at six stations at the western end of the line at stations Nos. 1, 2, 3, 4, 5, and 7.

The laying of the 205 miles of 30 and 31-in. loop extending northeast ward from El Campo, Tex., is being handled by Bechtel Corp. and H. C. Price Co. as a joint venture. James P. Neill, vice president for H. C. Price, is acting as manager of the project; William von Phul, Jr., pipeline engineer, Bechtel Corp., is assistant manager. J. E. Ellis is spread superintendent for the Price western spread with headquarters at Wharton, Tex.; R. A. Conyes is supervising the Bechtel operations at Jasper, Tex.; Abe Reutzel is superintendent of the Price spread being transferred from Batesville, Miss., to the 30 and 31-in. project at Natchitoches, La. Pipe for the 30 and 31-in. loops has been consigned from Consolidated Steel Corp. by Trans-Arabian Pipe Line Co.

By August 21, approximately 6 miles had been laid by the Wharton spread and 6 miles by the Jasper spread.

La Gloria Corp. Plans Gathering System

CORPUS CHRISTI. — Construction of 8 to 10 miles of field gathering lines in Waskom field, Harrison County, East Texas, is expected to be undertaken early this fall by La Gloria Corp.

The lines will tie into about 15 La Gloria wells in the field. Gas from the wells will be processed at Arkansas Fuel Oil Co.'s 51,000-gal. daily capacity plant which serves the field and then taken through a 27-mile lateral to Texas Eastern Transmission Corp.'s 24-in. Big Inch main at a connection northwest of Marshall.

Texas Eastern is expected to start construction of the lateral in the near future. The project is scheduled for completion before November 1.

Originally, La Gloria planned to construct the connection to T.E.T.'s main and also to build a dehydration and liquid-extraction plant where the line joined T.E.T.'s main. At the com-

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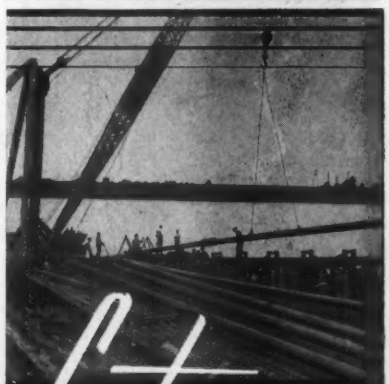

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pany's request, the Federal Power Commission held these operations would not bring La Gloria under the Natural-Gas Act. The plans were changed subsequent to the status-determination ruling by FPC.

La Gloria is continuing with plans for construction of a compressor plant to handle initially about 16,000,000 cu. ft. daily from La Gloria field in Southwest Texas. Contract is expected to be let in the next 2 or 3 weeks after the question of disposal of residue gas, either to a transmission pipe line or to a carbon-black plant, is settled.

Pipe-Line Movements Are Up 16 Per Cent

An increase of 16 per cent over last year or a total movement of 638,007,689 bbl. of oil by 44 large pipe-line companies resulting in transportation revenues of $84,302,786 during the second quarter of this year, has been reported by the Interstate Commerce Commission.

The three revenue leaders for the second quarter this year were Humble Pipe Line Co., with $9,403,842, an increase of 13.8 per cent over the similar period last year; Stanolind Pipe Line Co. with $8,768,666, an increase of 23.9 per cent; and Sinclair Refining Co. with a revenue of $6,073,626, an increase of 5.4 per cent.

Humble handled the greatest volume of traffic, showing a movement of 74,158,692 bbl. Interstate Oil Pipe Line Co. was second with 42,082,910 bbl.

Greatest percentage increase in revenues was reported by Buffalo Pipe Line Corp. with a 64.4 per cent gain.

Motor fuel delivered from pipe lines in the first 5 months of this year totaled 110,820,000 bbl., an increase of 21.1 per cent over the first 5 months of last year.

The ratio of motor fuel turned into lines to total motor-fuel production amounted to 33.9 per cent in the first 5 months of the year, compared to the 28.3 per cent in the corresponding 1947 period.

Gulf Builds Crude-Oil Dock on Mississippi

Gulf Refining Co., Houston pipeline division, is building its first crude-oil loading dock on the Mississippi River at a point near Astricia, La. The terminal will be capable of handling approximately 25,000 bbl. daily of crude oil delivered from both pipe lines and barges from three fields.

The new terminal is scheduled to be in operation by September 10, although not fully completed at this

PIPELINES
•Finances
•Equipment
•Organization
TO BUILD

OIL PIPELINES GAS PIPELINES GASOLINE PIPELINES WATER PIPELINES

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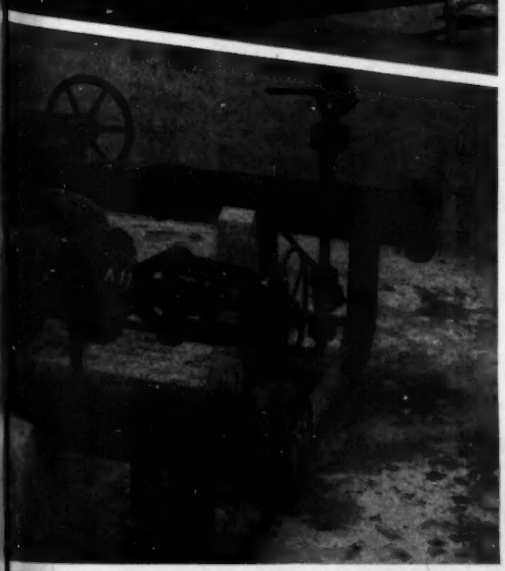

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SCRAPER TRAPS

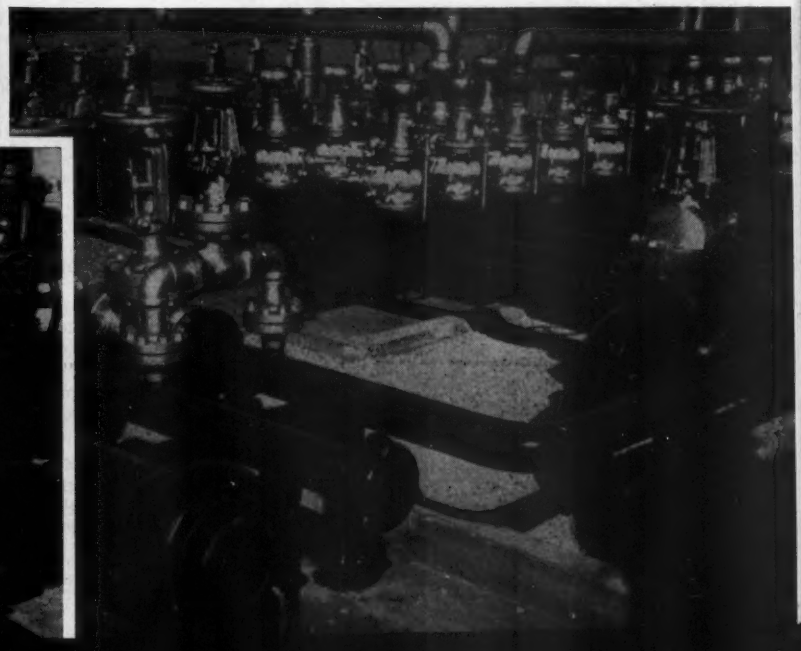
AN OPEN and SHUT CASE OF MECHANICAL SUPERIORITY

Pipe line scraper traps need no longer be a source of trouble and inconvenience. Bull plug type closures which eventually become leaky due to frequent unscrewing of the threads, and heavy, multi-bolt blind flange closures which require a lot of breaking out and making up time (and a lot of heavy lifting!) are being replaced with UNIBOLT Scraper Traps by many pipe line operators.

These modern, easy-to-operate, UNIBOLT Scraper Traps are opened by simply releasing two bolts. If desired, a hinged type closure, or blanking plug, can be furnished to further simplify opening and closing, a feature which is particularly desirable on the large sizes. A renewable resilient gasket effects a pressure-tight seal when the two bolts are tightened. Because it employs the standard UNIBOLT design, all parts for a given size pipe line coupling or scraper trap are readily interchangeable.

See your Composite Catalog for complete details or write for descriptive literature.

THORNHILL-CRAVER COMPANY
HOUSTON, TEXAS



OIL PIPELINES GAS PIPELINES GASOLINE PIPELINES WATER PIPELINES

In Corpus Christi, Texas . . .

Headquarters for Dependable Pipe Protection

Strategically located in the heart of the South Texas fields, the Corpus Christi plant of Pipe Line Service Corporation is devoted exclusively to the application of pipe protection. Located on a 6-acre site, this modern plant has complete facilities for cleaning, priming, coating and wrapping, as well as for reconditioning used pipe.

The Corpus Christi plant is just one of six plants conveniently located to serve pipe users on gathering, transmission and distribution lines.

Pioneers in Steel Pipe Protection

PIPE LINE SERVICE CORPORATION

General Offices and Plant: FRANKLIN PARK, ILL.

Plants at: Glenwillard, Pa.; Longview, Tex.; Corpus Christi, Tex.; Harvey, La.; Sparrows Point, Md.

time. The present plan is to utilize the Astricia terminal for loading tankers bound for Port Arthur. Tankers rather than barges are used for this movement because they are more suitable to the existing transportation situation in the area.

Tankage at the Astricia terminal includes four cut-down 80,000-bbl. tanks with 64,000-bbl. capacity each and one 20,000-bbl. tank.

Contract for Imperial Valley Line Is Let

Southern California Gas Co. recently awarded a contract for its 76-mile transmission line in the Imperial Valley area to bring natural-gas service to nine communities in that area.

Alex Robertson Co. will install 28 miles of 8-in. pipe from a take off on the 30-in. Texas line near Desert Center to a point along the All-American Canal. Work is expected to start September 1. The second section from the All-American Canal to Calexico will be constructed by Utility Construction and Signal Pipe Line Co. as a joint venture. They will lay 48 miles of 4-in., 6-in., 8-in., 12-in., and 16-in. pipe. Construction is expected to begin immediately and is to be completed by November 1.

Gas supplies for the new line are to be obtained from the 1,200-mile natural-gas pipe line operated by the company and its supplier, El Paso Natural Gas Co. The Imperial Valley line is to be constructed of approximately 20 miles of used and reconditioned pipe and the balance of new pipe. Estimated cost of the project is $1,150,000.

A second contract was awarded to Pacific Pipe Line & Engineers, Ltd., for the construction of a 20-in. line connecting the Flintridge-La Canada distribution system with the Pasadena distribution system and to the 30-in. pipe line now being run from Santa Fe Springs to Pasadena. Work on this project is already under way.

A third project, now up for bids, calls for the laying of some 45,000 ft. of 2-in., 3-in., and 4-in. pipe to supply the new Panorama Ranch development in Van Nuys.

Kentucky Line Is 80 Per Cent Completed

Petroleum Exploration Co.'s 24-mile, 6-in. natural-gas pipe line from Himyar gas fields in Knox County, Kentucky, to Onedia, in Clay County, is now 80 per cent complete and is expected to be completed by October 1.

The new line will serve consumers in the central and southeastern part of Kentucky. The company has more than 100 wells on lines north and east of Oneida, most of which have been capped for lack of shipping facilities.

Texas Gas' Hearing Set

The Federal Power Commission has set hearing to open September 27 in Washington on the amended application filed by Texas Gas Transmission Corp. requesting authorization to construct and operate an 840-mile natural-gas pipe line from Carthage field of East Texas to the vicinity of Middletown, Ohio. *(For details of the proposed project see The Oil and Gas Journal, July 1, page 91).*

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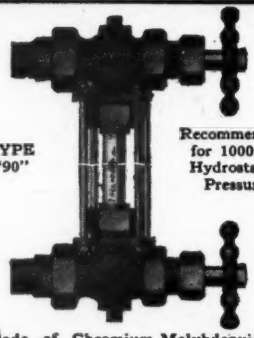

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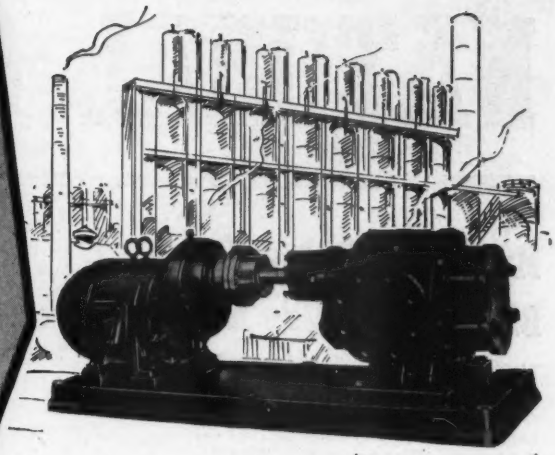
That's what oil men call the Worthington GR Rotary Pump—a heavy-duty veteran of many years' service in refineries and throughout the petroleum industry. Always ready to do what's expected—and a good bit more—the GR's all-around usefulness is now increased by new inboard bearings and mechanical seals for overhung drives. Fully described in Bulletin W-487-10B.



Worthington Rotary Pump, Type GR.
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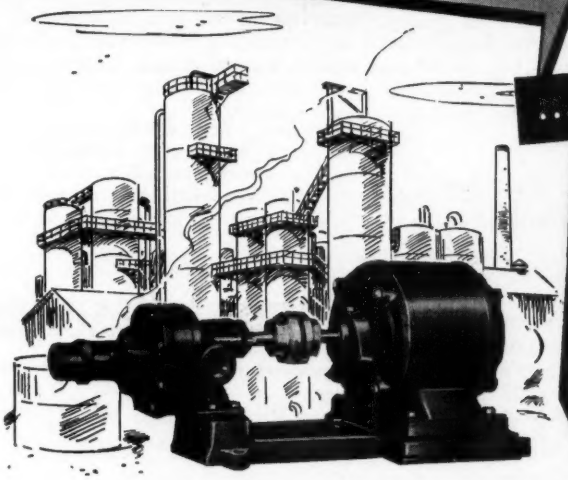

Worthington Rotary Pump, Type GA.
Capacities to 51 gpm. Pressures to 100 psi.

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Latest and lightest additions to the Worthington Rotary Pump family, the new GA's are similar in general design and construction to the famous GR's—and equally smooth performers in their class. Bulletin W-484-B31 contains a detailed description.

Both the GR and the GA show the advantages of Worthington's long, successful experience in custom-building pumps to refinery requirements. Identical in their outstanding efficiency and economy in many refinery pumping jobs, they join in proving *there's more worth in Worthington.*

Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, N. J.

WORTHINGTON

P7-10

THE WORLD'S LARGEST MANUFACTURER OF PUMPS

NATURAL GAS

Myers Says Rizley-Moore Bill Will Again Be Issue

WASHINGTON.—The Rizley-Moore bill to amend the Natural Gas Act was dusted off for the political campaign last week by Sen. Francis J. Myers of Pennsylvania, who called it a "piece of legislative sleight of hand."

In the appendix of the Congressional Record—repository of speeches which members do not make on the floor of House or Senate—Myers declared that the failure of the bill to get through the Senate this year had only delayed and not killed it and it will be an issue which will face the next Congress.

Myers pointed out that only the massed opposition of the Democrats on the Senate interstate Commerce committee, supported by Republican Sen. Charles W. Tobey of New Hampshire, prevented action on the legislation last session. On the showdown vote to report the bill, he said, the opposition received enough additional Republican support to defeat the move on the ground, in at least one case, that President Truman would veto it and give the Democrats a good campaign issue.

"Of course," Myers said, "it would have been a good issue, for the people of the United States do not take kindly to bold attempts to enact legislation expressly designed to throw millions of consumer dollars into the hands of any utility, just for the fun of it.

"As it passed the House, the bill would have given pipe-line companies the right immediately to raise substantially the prices they can charge for natural gas which they own in their own wells. It would have enabled pipe-line companies to construct new lines in almost any direction free from any significant or effective federal control. They could thus have invaded new markets without regard to any basic factors such as the availability of gas for older markets now dependent upon the fuel for essential manufacturing and heating uses; they could have charged what the traffic would bear for their gas, subject only to Interstate Commerce Commission (rather than Federal Power Commission) supervision over rates, and that supervision would have been restricted only to the actual transportation charges.

"The Housed-passed bill would have dealt a death blow to effective federal supervision of the natural-gas industry as outlined in the historic Natural Gas Act of the late 1930's. It would have led to idiotic waste of a valuable natural resource.

"Even the various bills considered in the Senate would have gone far toward destroying Federal Power Commission protection for consumers and admittedly would have raised consumer rates.

"We beat them in this Congress. But they will be back next year, I am certain, seeking once again to get their special-interest legislation through. It is an issue which will face the Eighty-first Congress."

FPC Dismisses Wisconsin Southern Application

The Federal Power Commission has dismissed an application filed by Wisconsin Southern Gas Co. requesting a rehearing of the commission's findings and order of June 30, 1948, dismissing the company's application for authorization to acquire and operate the Genoa City pipe-line system of Wisconsin Gas & Electric Co. and to construct other related facilities for natural-gas transmission.

The commission's order of June 30 was on the basis that the company does not have sufficient gas available to meet the requirements both of its existing customers and those which it proposed to serve from the Genoa City line.

Gas-Utility Gains for First Quarter Reported

Total revenues of the gas-utility industry from natural-gas sales to ultimate consumers in the first quarter of 1948 ending March 31 amounted to $324,600,000, an increase of 19.9 per cent over the same period a year ago, according to a report of the American Gas Association.

Natural-gas sales in the first quarter of 1948 totaled 839,700,000 M.c.f., or 15.3 per cent greater than the similar period in 1947. Sales to residential users were up 24.1 per cent, commercial sales increased 20.8 per cent, and industrial sales were up 0.3 per cent.

Total ultimate consumers served with natural gas by utilities in the first quarter of 1948 increased 12.5 per cent from 9,700,000 to 11,000,000. The largest relative gain was registered in residential gas consumers.

For the 12-month period ending March 31, 1948, total natural-gas revenues were up 19.6 per cent over the same period a year ago. The 12-month cumulative total of industrial gas sales increased 5 per cent over the preceding period.

Texas Eastern Is Authorized Facilities

The Federal Power Commission has authorized Texas Eastern Transmission Corp., Owensboro, Ky., and Memphis, Tenn., to construct additional facilities to expand the system capacity of its Memphis division from 185,000,000 cu. ft. to approximately 200,000,000 cu. ft. daily. New facilities are estimated to cost $843,492.

The proposed facilities include a 1,200-hp. compressor unit in each of three stations located in Mississippi and Arkansas, a new 2,000-hp. compressor station on the company's Lisbon pipe line in Claiborne Parish, Louisiana, and approximately 1½ miles of 18-in. pipe extending the ends of an existing 14-in. river crossing at Greenville, Miss., to header stations on each side of the river.

Natural Gasoline

New Plant Under Way In Sivells Bend Field

HOUSTON.—Construction has been started on Standard Oil Co. of Texas' new gasoline plant in the Sivells Bend field, Cooke County, North Texas.

The plant initially will consist of compression and mechanical separation facilities; absorption equipment which will allow recovery of all light hydrocarbons, particularly butane and propane, are planned for erection in a year or so.

A gathering system is being constructed to tie into all wells in the field. The initial compresssion plant will handle about 2,500,000 cu. ft. daily of casing-head gas which previously has been wasted. Capacity after absorption facilities are added will be about 5,000,000 cu. ft. daily.

The initial installation is expected to be ready within about 6 weeks. The work is being handled by company personnel under the direction of the natural-gasoline department in El Paso. Cost of the compression plant will be about $125,000, and total cost after the change is made to the absorption process is estimated at $500,000. The company is now negotiating for sale of the residue gas to a transmission pipe line.

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Call The Refinery Engineering Company for a conference in the early stages of any contemplated construction program. Treco engineers can furnish you reports on operating costs, yields and profits on any proposed construction. Conferences with you and your staff can determine the proper type of plant to give you the greatest realization of profit and quickest return of your investment.

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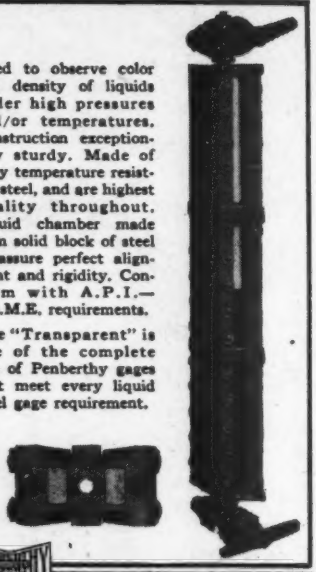
The "Transparent" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.



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REFINING

Continental to Expand Ponca City Refinery

A $7,750,000 program to increase the crude capacity of the Ponca City refinery of Continental Oil Co. from 33,500 to 52,500 bbl. daily was announced August 21 by H. G. Osborn, vice president in charge of manufacturing.

Osborn said construction is scheduled to begin immediately and to be completed within 18 months.

Major item in the expansion program will be the installation of a 30,000-bbl. crude topping unit, with full alloy protection, to process West Texas crude.

Also planned are installation of a new gasoline treating unit, rearrangement of refinery pipe lines and tankage, installation of new gasoline and gas recovery facilities, and modernization of the Thermofor catalytic cracking unit recently acquired from the Government. Of the total expenditure, about $1,000,000 will be spent on the Thermofor unit, which Continental operated during the war to produce aviation gasoline.

Continental now is building a $9,200,000 refinery in Billings, Mont., and is planning to begin late this year a $5,000,000 project to double the size of the company's refinery in Denver. The Denver refinery now has a crude capacity of 3,500 bbl. and a cracking capacity of 1,500 bbl.

With completion of the three projects, Continental will have a total crude charging capacity in its eight refineries of more than 88,000 bbl. daily. The company's crude production now is more than 110,000 bbl. daily.

United Refining Buys Healey Petroleum Corp.

United Refining Co., Warren, Pa., has purchased approximately 80 per cent of the common stock of Healey Petroleum Corp., Bradford, Pa., at a cost of about $4,272,000. United has offered to purchase the remainder of the total 85,440 shares of the stock at the same price per share. The offer is to expire August 31.

United, which has been buying the crude oil produced by Healey since 1944, will operate the Bradford firm in that company's headquarters in Bradford.

Twenty-seven properties totaling 9,000 acres and having a daily production of 1,800 bbl. were included in the purchase. All of the properties but three were located in McKean County and the others in New York state.

Harry A. Logan, vice president of United has been elected president of Healey Petroleum. Harry A. Logan, Jr., was named vice president, and Raymond J. Brennan, secretary. William J. Healey, president and principal stockholder of Healey Petroleum has resigned.

Earlier this month South Penn Oil Co., Pittsburgh, Pa., purchased Grant & Mohan Oil Co. of Bradford, Pa., for $10,767,000, and included 1,157 acres of oil land in the Bradford field and 200 acres in the Bolivar, N. Y., field, and 520 acres of gas property in the Brocton-Fredonia, N. Y., field. Grant & Mohan is being operated as a subsidiary of South Penn with William D. Gallup of Bradford as president.

Shell's New Chemical Plant Goes on Stream

Shell Chemical Corp.'s new chemical plant for the manufacture of methyl ethyl ketone and secondary butyl alcohol recently went on stream at Houston. The third of its type to be completed by Shell Chemical, the plant will increase the firm's capacity for these products by 150 per cent. The new unit is a part of the company's $43,000,000 expansion program begun by the company in 1946.

Another of the units at the Houston site which is nearing completion and is expected to go on stream by late summer or early fall is the first commercial synthetic glycerine plant, according to Jan Ostermeyer, president of Shell Chemical Corp. This new $8,000,000 plant will synthesize glycerine by means of a process developed at Emeryville, Calif., laboratories of Shell Development Co. Raw materials used are salt, water, and petroleum.

Other units scheduled to come on stream later will include plants for the production of ethyl alcohol and ethyl chloride.

Program Is Outlined For A.C.S. Meeting

A discussion of the problems involved in building a 1,000-mile pipe line across the deserts of Saudi Arabia

presented by B. E. Hull, president of Trans-Arabian Pipe Line Co., New York, will be one of the highlights of the 114th national meeting of the American Chemical Society, division of petroleum chemistry, fall meeting, at St. Louis, Mo., September 6-10. Hull's address will be followed by colored sound motion pictures of the Middle East oil fields, pipe-line construction, and refineries.

Production of high-octane gasoline from United States and Middle East crude oils, the manufacture of synthetic gasoline from natural gas, the antiknock properties of certain airplane fuels, and motor-fuel needs of new automobiles which will be on the market within a year, will also be considered, according to Dr. Gustav Egloff, research director of Universal Oil Products Co. and chairman of the society's division of petroleum chemistry.

Pilot Plant Completed At Mt. Carmel, Ill.

Electronic Chemical Corp has completed a pilot plant at Mt. Carmel, Ill., designed to produce liquid hydrocarbons from natural gas by an electro-chemical process. The process is capable of producing 4 gal. of liquid hydrocarbons from 1,000 cu. ft. of methane gas, according to Dr. Henry M. Unschuld, the company's director of research.

The liquid hydrocarbons produced from methane gas are 99 per cent pure, Dr. Unschuld said. These are the basic products from the manufacture of high-octane gasolines, acetone, freon, ethyl alcohol, formaldehyde, and other products.

Thickened Fuel Is Adapted to Industry

Thickened fuel, a wartime developed product used in flame throwers and incendiary bombs, is being adapted to industrial use as a fuel igniter to aid power generation, it was reported by Esso Standard Oil Co.

Made of thickened diesel oil the product will fire stoker-fed industrial boilers to full operating steam pressure in 30 minutes compared with 8 hours usually required by wood and coal kindling. Five gallons of the product were used in a test to fire boilers capable of producing up to 500,000 lb. of steam pressure per hour.

Developed originally for a large utility company as a product that would permit rapid increases in power output, Esso Standard expects to expand application of the fuel igniter to railroads and soft-coal consuming industries using stoker-fed boilers.

W.P.R.A. Will Discuss High-Sulfur Crudes

Discussion of the processing of high-sulfur crude oil will highlight the regional technical meeting of the Western Petroleum Refiners Association in Lansing, Mich, August 27.

After presentation of a paper—"Processing of Sour Crudes"—by R. B. Pierce, Globe Oil & Refining Co., Lemont, Ill., the meeting will be opened for discussion and consideration of questions submitted from the floor.

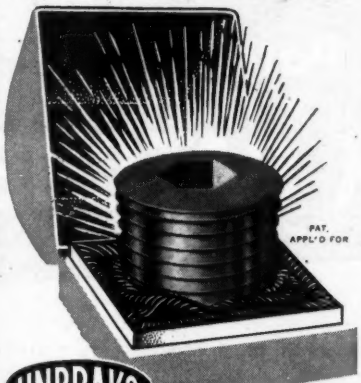
U. S. Carbon Plant Is Sold

Cabot Carbon Co., Boston, Mass., has purchased the carbon black plant at Monument, N. M., from War Assets Administration for $773,000. The 15,200,000-lb. annual-capacity plant was constructed for wartime production by the Government at a cost of $2,250,000.

Socony-Vacuum Doubles Fellowship Program

An addition of at least 10 more fellowships in chemistry and physics to the 10 established last year by Socony-Vacuum Oil Co., Inc., will be established through the company's recent appropriation of $50,000 for a doubled program of fellowships for the 1949-50 period.

New and Exclusive



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These entirely new and exclusive precision-made plugs—for water, steam, air, oil and hydraulic pressure—are fully formed with the roundness and concentricity so desirable in a plug. Tests have proven that they materially reduce leakage on some applications and eliminate it entirely on others.

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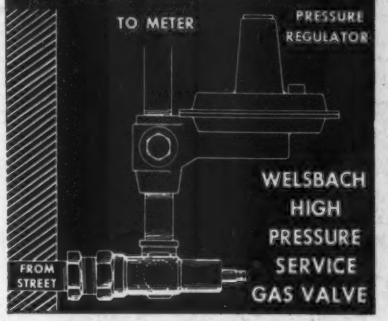

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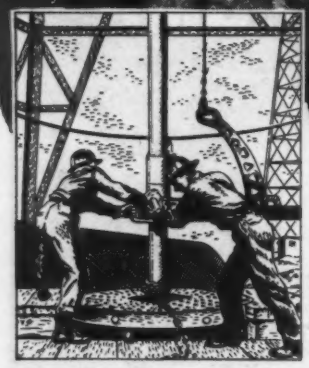

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Among the

Drilling Contractors

Hinkle Drilling Sells Holdings to Gulf Oil

HOUSTON. — Gulf Oil Corp. was disclosed here last week to have purchased Hinkle Drilling Co.'s holdings in North Port Neches field in Orange County, Texas.

The properties consisted of 1,000 acres and included four wells with a total daily allowable of 513 bbl. Consideration was not revealed. The transaction was made effective August 1.

Hinkle brought in the discovery well for North Port Neches field in September 1946. He originally took the 1,000 acres included in the sale to Gulf in the form of farm-out leases from Shell Oil Co., Inc., in 1946.

A.A.O.D.C. and Texas U. Plan Institute Series

The American Association of Oil Well Drilling Contractors and University of Texas have announced plans for the current year for an industry-wide series of five management institutes to be held in oil centers in 11 oil-producing states.

Outstanding authorities on management problems will lead the five institutes which may be obtained in a drilling center when a minimum enrollment of 15 is assured.

With the exception of application of cost factors, which lasts 2 days, institutes will be of 1-day lengths and will cover the following subjects: (1) Principles of top management organization and control. (2) Building a personnel organization. (3) Management's opportunity in accident prevention. (4) Application of cost factors in contract drilling. (5) Security programs for drilling personnel.

The series will be available at any or all of the following centers, depending on advance registration: Bakersfield, Long Beach, and Los Angeles, Calif.; Denver, Colo.; Wichita and Great Bend, Kans.; Mt. Vernon, Ill.; Evansville, Ind.; Lake Charles and Shreveport, La.; Jackson, Natchez, and Brookhaven, Miss.; Hobbs, N. M.; Oklahoma City and Tulsa; Corpus Christi, Dallas, Fort Worth, Houston, Midland, San Antonio, and Wichita Falls, Tex.; and Casper, Wyo.

Advance registration for the management institutes will close October 1 so that schedules may be arranged at the association's annual convention in Houston October 11.

Helmerich & Payne, Inc., have drilling contract on Union Producing Co. 2 G. G. Music, in C NW SW 24-10n-21w, southeast of Elk City, in eastern Beckham County, Kansas. The test is to go to 10,000 to 10,500 ft. The 1 Music in Section 25 was drilling below 5,400 ft.

Fleet Drilling & Producing Co., Ada, Okla., and Russell Maguire are spudding at 1 Dobson, a wildcat in SW NE NE of 17-17n-1e, eastern Logan County, Oklahoma.

Aylward Drilling Co. and others will drill a wildcat in Rooks County, Kansas, the 1 Marcotte. Location is in SE SE SW 18-9-19, 1 mile north of Gick pool. Phillips Petroleum Co., Zephyr Drilling Co., and Champlin Refining Co. will support the test.

Harry L. Edwards Drilling Co. will drill Kirby Petroleum Co. 1 Mrs. T. G. M. DeBate, Forrest Hill area wildcat, in Rapides Parish, South Louisiana. The test is projected to 8,000 ft.

Ferrell Drilling Co. is the contractor on the A. J. Stormfeltz 1 Brown, a rank wildcat in Decatur County, Kansas. Location is in SE SW SW 21-3-27, 16 miles northwest of Adell pool of northern Sheridan County.

Pegg Brothers is drilling O. W. Killam 2 William H. Russell Est., wildcat in the Fernando Rodriquez Survey, about 12 miles south of San Antonio in Bexar County, Texas.

Herndon Drilling Co. has set casing in the Arbuckle at the 1 Bemis, in SW SW SE 29-13-19, 1½ miles north of Irvin pool in Ellis County, Kansas. Arbuckle was marked at 3,872, minus 1,112, and pipe set at total depth of 3,932 ft.

D. J. Henning Drilling Co. is below 1,662 ft. on a test for gas being drilled for Royal City Co. of New Westminster on Lulu Island in the Fraser Valley of British Columbia. D. D. Kennedy is in charge, assisted by W. Huff. The company is also handling contracts in the Lloydminster field.

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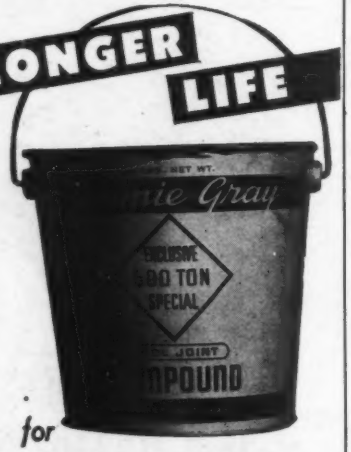

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L. D. Cain Drilling Co. Houston

Growth.—L. D. Cain Drilling Co., City National Bank Building, Houston, was organized September 1, 1941. Its initial operations were with one small 3,500-ft. power rig in Boling field in Wharton, County, Texas.

L. D. CAIN

Cain Drilling now operates five heavy-duty rigs. In the 7 years since its organization, the company has drilled 153 wells in the Gulf Coast area.

Equipment.—Of Cain's five rigs, two are power and three are steam rigs. Lightest is a 6,000-ft. power rig. The other power rig is capable of about 12,000 ft. Deepest of the three steam rigs is capable of about 14,000 ft.

Operations.—The rigs are now drilling field-well locations along the Upper Texas Gulf Coast. These contract jobs are in New Ulm, Fanette, Goose Creek, Fostoria, and Hull fields.

Many of the wells which Cain has drilled are 10,000-ft.-and-below jobs. In addition to the drilling business, Cain also has some production in Bloomington field, Victoria County, and in Humble field, Harris County.

Personnel.—Prior to organizing the drilling firm, Cain was sales manager in Houston for Portable Rig Co. for about 12 years. Previously he was in drilling and production work.

Other supervisory personnel are: C. H. Phifer, Cain's assistant in the Houston headquarters; J. M. Flower, Houston, superintendent; and the following toolpushers: C. H. Knoble, New Ulm; M. McKenzie, Beaumont; H. A. Davenport, Goose Creek; L. J. Dunn, Livingston; M. P. Trenthan, Hull; and T. G. Theriot, Humble.

Sidelights.—Auxiliary equipment for drilling work includes a 150-hp. dredge which is used to clear access to swamp locations. . . . The superintendent, tool pushers, and drillers have been promoted up from other jobs within the company. . . . Cain is active in the American Association of Oilwell Drilling Contractors and at present is serving as Gulf Coast regional vice president. . . . His assistant, Phifer, is secretary of the Houston A.A.O.D.C. chapter.

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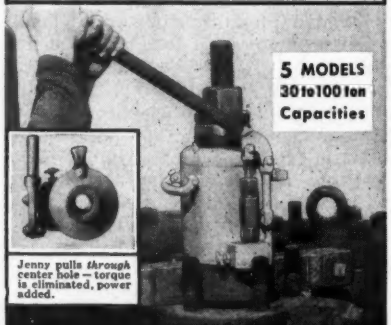

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Exploration and Drilling

S. E. New Mexico Gets First Pennsylvanian Production

THE first Pennsylvanian production for southeast New Mexico was proven when Texas Pacific Coal & Oil Co. 39-A-2 State flowed 40°-gravity oil from a sand zone in the Pennsylvanian at 10,900-49 ft. (corrected). The well is located on the southwest side of shallow Eunice field, 900 ft. from the north, and 1,650 ft. from the west lines of Section 9-22s-36e.

A drill-stem test between 10,900-49 ft. (corrected measurement), had gas in 6 minutes, mud in 1 hour and 15 minutes, and the oil started flowing in 1 hour and 19 minutes. Through a 5/8-in. bottom choke and a 1-in. opening at the top, the well produced 14.6 bbl. of 40°-gravity oil into the tank during the next hour. There was a 10 per cent mud cut, but no formation water was present in the cut. The gas-oil ratio was 935 cu. ft. per barrel. When the tool was pulled, the drill pipe unloaded fluid all the way out.

Reports indicate the Pennsylvanian sand was topped at 10,920 ft. (corrected). Drilling continued through the sand down to 10,939 ft. (corrected). Then the next 10 ft. was cored. The upper 3 ft. of the recovered core is reported to have been saturated with oil. Coring was resumed and carried from 10,949 to 10,972 ft. Reports on this latter interval say that the cores showed only shale, no sand, no shows of either oil or gas. Drilling was then resumed in shale.

The new discovery is located about 10 miles southwest of the town of Eunice, which puts it on the southwest side of Eunice field, in an area where Texas-Pacific has fairly extensive holdings. Eunice field production is mainly from the Grayburg pay in the Permian at around 3,800-4,000 ft., with a proven productive area of about 40,000 acres.

This is the fourth Pennsylvanian strike on the Central Basin platform proper, the other three being on the Texas side. To date none of the previous ones have developed into anything of substantial importance. In 1946 Helmerich & Payne, Inc., took over a deep dry hole in shallow White & Baker field of Pecos County. Backing up, they made a small well in the Pennsylvanian Strawn limestone.

In 1947 Stanolind Oil & Gas Co. made a small well in the Pennsylvanian in Block 39 field of Crockett County, in its University "TT" 1, Section 1, Block 39, University Lands. The same company found some Pennsylvanian production as a deeper pay in Addis field of Ector County, in its 1 Kayser, Section 34, Block 43, T-2-S, T&P Survey.

Geologically the New Mexico strike, as well as those mentioned above, are all associated with the Central Basin platform. They should have no particular connection with the Pennsylvanian reef strikes on the east side of the Midland Black Shale basin.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

TEXAS GULF COAST.—New high-gravity production in northwestern Matagorda County has been discovered by Rowan Drilling Co. et al at their 1 Stovall, which flowed oil and gas from perforations at 6,727-30 ft., with total depth at 8,760 ft.

SOUTH LOUISIANA.—The fifth producer for the rapidly developing offshore area was brought in at Kerr-McGee 3 State Block 32, off Terrebonne Parish, flowing 30 bbl. of oil per hour from the same horizon as the discovery well.

ROCKY MOUNTAIN.—Tests of oil and then water caused interest in Pacific Western-National Associated's 1 Grimes-Government, Bridge Creek wildcat on the east side of the Powder River Basin in Wyoming. Gas was recovered on drill-stem test of the Frontier at Atlantic Refining Co. 1 Tribal, Riverton wildcat in Fremont County.

CANADA.—Continental-Leduc-Woodbend 3 reports a flow at the rate of 960 bbl. of 40°-gravity oil per day from the lower Cretaceous to become the first commercial production in the Leduc area from that horizon.

PERMIAN BASIN.—Cities Service Oil Co. is preparing to complete its Ector County discovery, which tested 264 bbl. of oil from the Grayburg. The same company's 1-Y Univ. flowed more than 61 bbl. of oil per hour on drill-stem test to extend Wolfcamp production in Shafter Lake pool in Andrews County.

MID-CONTINENT.—In Sedgwick County, Kansas, Gaty 1 Broers may open a Pennsylvanian pool near the Fairview field, which produces from the Mississippian. In Garvin County, Oklahoma, Sinclair Prairie 1 Adair flowed 620 bbl. of oil per day to extend the Southeast New Hope pool. Also in Garvin County, Sohio Petroleum Co. continues testing the east offset to the Eola field discovery.

MISSISSIPPI.—First Mississippi production from Sparta sand may be the result of shows encountered at Kemp-Gilster-Vaughey-Hodge 3 V. T. Craig Estate, LaGrange field, Adams County.

NORTH LOUISIANA.—Barnsdall Oil Co. found a new pay zone in the Driscoll field of Bienville Parish when its 1 Davis Bros. Lumber Co. was completed with initial production of 10,800,000 cu. ft. of gas from two intervals in the Pettit.

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TEXAS GULF COAST

New High-Gravity Area in Matagorda

HOUSTON.—Rowan Drilling Co. and Texas Gulf Producing Co. 1 Guy F. Stovall et al is opening a new high-gravity oil-producing area in northwestern Matagorda County about 5 miles north of production at Midfield.

The well flowed high-gravity oil from perforations from 6,727-30 ft. The flow was accompanied by a considerable amount of gas. The well was shut in, and a potential gage will be run later when storage tanks are completed.

The wildcat is located in Section 18, I&GN Survey, Abstract 287, and is 3 miles northwest of Midfield townsite. Total depth was 8,760 ft., and 5½-in. pipe was set at 6,807 ft.

In Live Oak County, Continental Oil Co. 1 Clay West Burns Christenson, wildcat test 5½ miles southwest of George West and a mile northeast of the Kittie Burns field discovery, flowed gas and condensate from perforations from 7,170-84 ft. Total depth is 10,312 ft. with 7-in. casing set to 8,898 ft. The location is in the Willie S. Novell Survey 58.

Operators acidized the well with 1,000 gal. and on a 15-hour test with 5/32-in. choke, flow was 7 bbl. fluid, half acid and water and half condensate, with gas-condensate ratio of 85,500-1. Testing continued.

On the east side of Dyersdale field in Harris County, H. A. Potter and M. G. Hansboro 1 Brown et al, Brittan Survey, was testing from perforations from 3,488-94 ft. Initial gage was 70 bbl. of oil daily through 10/64-in. choke with 1,050 psi. pressure on the tubing.

Commencement of drilling operations off the Texas Coast in the Gulf of Mexico appeared imminent last week. Stanolind, Humble, and Ohio Oil-Melben were reported to have platforms ready for operations in areas off Brazoria and Galveston counties.

Thirty-eight locations were announced for areas along the Upper Texas Gulf Coast. Of these, 14 were in District 2 and 24 in District 3. Number of locations by counties: four—Brazoria; three—Jackson and Refugio; two—Calhoun, Goliad, Galveston, Hardin, Walker, Wharton, and Harris; and one—DeWitt, Gonzales, Karnes, Victoria, Austin, Chambers, Jasper, Liberty, Matagorda, Montgomery, Newton, Orange, Fort Bend, and Liberty.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Hardin County: Village Mills wildcat, gas well—Houston Oil Co. of Texas 1 Houston Oil & American Republics fee, E. Lubititit Sur., top sand 8,944 ft., TD 9,386 ft., perf. 8,944-80 ft., PT 4,800,000 cu. ft. gas daily on 5/16-in. choke, TP 2,210 psi., SIP 3,180 psi., dry gas, no water.

Newton County: Gas-condensate wildcat—Houston Oil Co .of Texas 1 Newton County Lbr. Co., J. Harding Sur., 1¾ mi. S Gist field production, top sand 7,556 ft., TD 7,707 ft., perf. 7,556-80 ft., PT 4,103,000 cu. ft. gas and 19.65 bbl. condensate daily on ¼-in. choke, GCR 50,891, TP 2,736 psi., SIP 2,825 psi., no water.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Brazoria County: Continental Oil Co. 1 Holley H. Roberts et al, S. F. Austin Sur. A-20, 1 mi. S W. Columbia townsite, dry, TD 11,859 ft.

Jack W. Frazier & R. N. Ranger 1 Mrs. Margaret Aldridge, M. V. O'Donnell Sur., 4 mi. W Manvel townsite, dry, TD 6,225 ft.

Superior Oil Co. 1 C. E. Carlson et al, Freeman Pettus Sur. A-114, dry, TD 10,315 ft.

Calhoun County: The Texas Co. 1 Mrs. Maude B. Traylor, Phillip Dimmit Sur., 3½ mi. NW Olivia, dry, TD 9,297 ft.

Galveston County: Sam E. Wilson, Jr., 1 Davis et al, M. Muldoon Lge., 2 mi. NE League City townsite, dry, TD 9,809 ft.

Jefferson County: Chance Bros. Drlg. Co. 1 Schuchardt, BBB&C Sur. A-81, Sec. 364, 2½ mi. S Cheek, junked hole, TD 8,592 ft.

Victoria County: L. D. Cain 1 J. M. Maroney, SA&MG RR Sur. A-461, 1 mi. NE Bloomington, dry, TD 5,063 ft.

Washington County: Humble Oil & Refining Co. 1 H. Lauter et ux, Nester Clay Sur. A-29, 3.2 mi. SW Independence townsite, dry, TD 8,240 ft.

Wharton County: John B. Coffee 1 Kountze & Stewart, L. L. Miller Sur. A-528, 12 mi. SW El Campo townsite, TD 6,510 ft.

SOUTH LOUISIANA

Offshore Discoveries Command Top Interest

NEW ORLEANS.—The recent series of discoveries in distant offshore tests in the Gulf of Mexico continued to command top interest among Gulf Coast oil developments.

The fifth producer, and the third well in the producing area discovered last November by Kerr-McGee Oil Industries, Inc., came in flowing at the rate of 30 bbl. an hour through a ½-in. choke. The well is Kerr-McGee 3 State Block 32, which like the No. 2 well, was drilled from the discovery platform.

No. 3 was perforated for production at 1,760-76 ft. in the same sands as the discovery. Tubing pressure was 200 psi. Flow at the 30-bbl.-an-hour rate was commenced when the well kicked off in the morning, and it continued at the same rate late in the afternoon.

In a company announcement, Humble Oil & Refining Co. said its 1 State Lease 801, Grand Isle discovery of last week, appears to have brought in a major oil field in the Gulf of Mexico. Final gage was 877.92 bbl. daily of 33°-gravity pipe-line oil through a ¼-in. choke from perforations at 8,640-65 ft. Total depth of the sidetracked hole, the second drilled from Humble's elaborate platform 8 miles off Grand Isle in Terrebonne Parish, was 8,951 ft.

Last week, the Louisiana Conservation Department set a temporary allowable of 288 bbl. daily for the Humble discovery and announced that permanent allowables for all offshore producers will be fixed following a hearing this week. Humble is now moving oil from the Grand Isle discovery to the mainland by barges.

Further reports on The California Co.'s discovery in Block 60, North Pass area, Plaquemines Parish, in the Gulf of Mexico, were that the well gaged 213 bbl. of 26.7°-gravity oil per day through 5/32-in. choke. Flowing pressure on the tubing was 660 psi. Hole was drilled and cored to a total depth of 8,888 ft., and log indicated numerous sands which may produce oil.

In its announcement, Humble said the Grand Isle discovery and the Caminado Pass salt-dome discovery indicated the effectiveness of the exploration methods used in the Gulf preceding the drilling activity. The Caminado Pass well, 6¼ miles southwest of the Grand Isle discovery, was drilling in salt which was topped at 4,672 ft.

Magnolia Petroleum Co. completed its Block 72 test offshore from Isles Derniere in Terrebonne Parish as a gas well. It was flowing dry gas from 7,266-76 ft. with 2,950-psi. tubing pressure through a 14/64-in. choke. Magnolia was preparing to start a second well at the location.

On land in the Louisiana Gulf Coast area, Union Oil Co. of California's new field discovery in Terrebonne Parish flowed almost clean oil at the rate of 8 bbl. per hour through a 9/64-in. choke from perforations at 7,896-7,902 ft. Gravity of the oil was 36.7°, and flowing pressure on the tubing, 1,250

psi. The well is 1 Louisiana Land & Exploration Co., Section 8-18s-16e.

Another Union Oil Co. of California discovery, also in Terrebonne Parish, was indicated, when the company's 1-9 State-Louisiana Land & Exploration Co., Section 27-213-14e, total depth 4,775 ft., gaged 135-bbl. of 37.7°-gravity oil a day through a 9/64-in. choke with 650-psi. flowing pressure on the tubing and a gas ratio of 422-1.

A total of 28 new locations were reported for the Louisiana Gulf Coast. Four each were in Jefferson and St. Mary parishes, three in LaFourche, and two each in Beauregard, Rapides, Terrebonne, and Vermilion. One locatio neach was reported for Acadia, Avoyelles, Iberia, Evangeline, Plaquemines, Point Coupee, St. Charles, St. Landry, and St. Martin.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Avoyelles Parish: New oil sand, Dave Haas-Atlantic Refining Co. 11 Haas Investment Co., 10-2s-2e, top sand 7,448 ft. (Sparta), TD 7,797 ft., perf. 7,448-70, 7,488-7,505 and 7,520-35 ft., PT 118 bbl. oil daily with 10/64-in. choke, GOR 390, TP 425 psi., 35.9° gravity, no water.

Plaquemines Parish: New sand, gas condensate, Point a la Hache—Sid W. Richardson et al E-5 Delacroix Corp., 34-16s-14e, top sand 10,142 ft., TD 11,016 ft., perf. 10,142-50 ft., PT 180 bbl. condensate daily with ¼-in. choke, GOR 23,760, TP 3,700 psi., CP 800 psi., 54° gravity, no water.

SOUTH LOUISIANA WILDCAT FAILURES

Calcasieu Parish: Sid W. Richardson, Inc., 1 R. Benoist, 24-9s-7w, dry, TD 9,568 ft.

St. Landry Parish: Hawkins & Graham Drilling Co. 1 LaGrange-Marks Unit X-1, 23-7s-5e, dry, TD 10,012 ft.

St. Mary Parish: The Sparta Oil Co. 1 W. Presscott Foster Est., 13-15s-10e, junked hole, TD 1,840 ft.

MICHIGAN

New Producer Shows Potential of 3,200 Bbl.

SAGINAW.—While preparing 16 new locations in 13 counties, oil and gas operators in Michigan completed 25 wells at depths ranging from 893 to 4,927 ft. to compile a record of 8 producing oil wells, 5 natural-gas wells and 12 dry holes, among them 7 wildcat failures.

Pure Oil Co. abandoned its 4 Lilly in Greendale Township, Midland County, at the deeper level. Panhandle Eastern Pipeline Co. 1 Beurmann in Genoa Township, Livingston County, gave up after 9 months of exploration and 4,342 ft. of drilling, abandoning the wells after testing brought only small amounts of natural gas.

Best of the new producers was an Arenac-Deep River completion of Leonard Oil, Inc., with initial potential of 3,200 bbl. a day. One of three Pentwater field producers was good for a 500 bbl. potential. Pure Oil Co. got two producers at near 4,400 ft. in the Beaver Creek section of Crawford County and a Garfield completion in Klakaska County by Sun Oil Co. flowed 96 bbl. on a 5-hour test after acidizing.

The new locations include two each in Crawford, Midland and Allegan counties, one each in Montcalm, Arenac, Van Buren, Mason, Ionia, Huron, Tuscola, Livingston, Mecosta and Gratiot counties.

MICHIGAN WILDCAT FAILURES

Allegan County, Dorr Township: Ford Henry 1 Joe Pelke, NE NW NE 19-4n-12w, dry in Traverse limestone, TD 1,598 ft.

Manlius Township: Ohio Oil Co. 1 Brandt Brothers, SW SW NW 27-3n-15w, dry in Traverse limestone, TD 1,374 ft.

Watson Township: Harry Stroud 1 Arlin G. Clark, NW NW SW 6-2n-12w, dry in Traverse limestone, TD 1,634 ft.

Clare County, Garfield Township: Samuel

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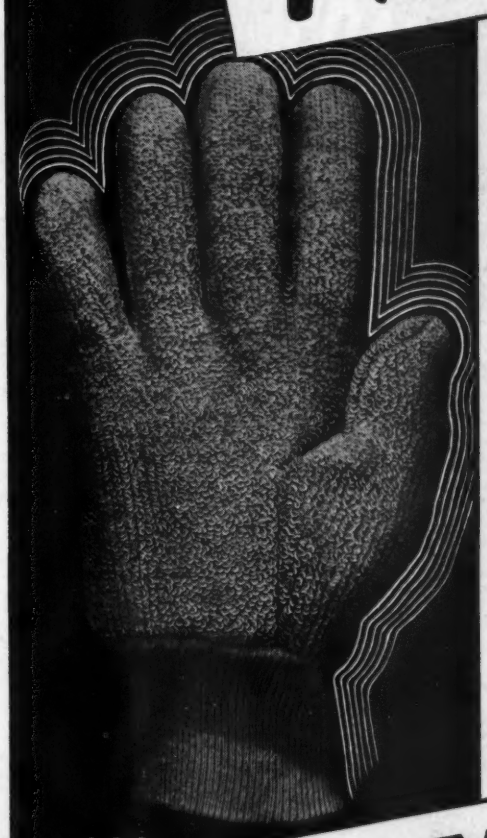

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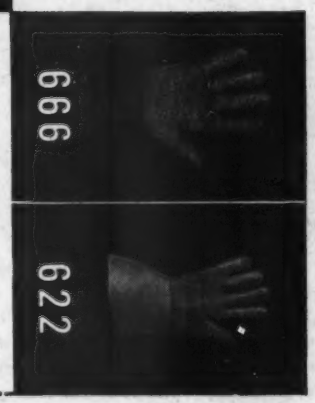

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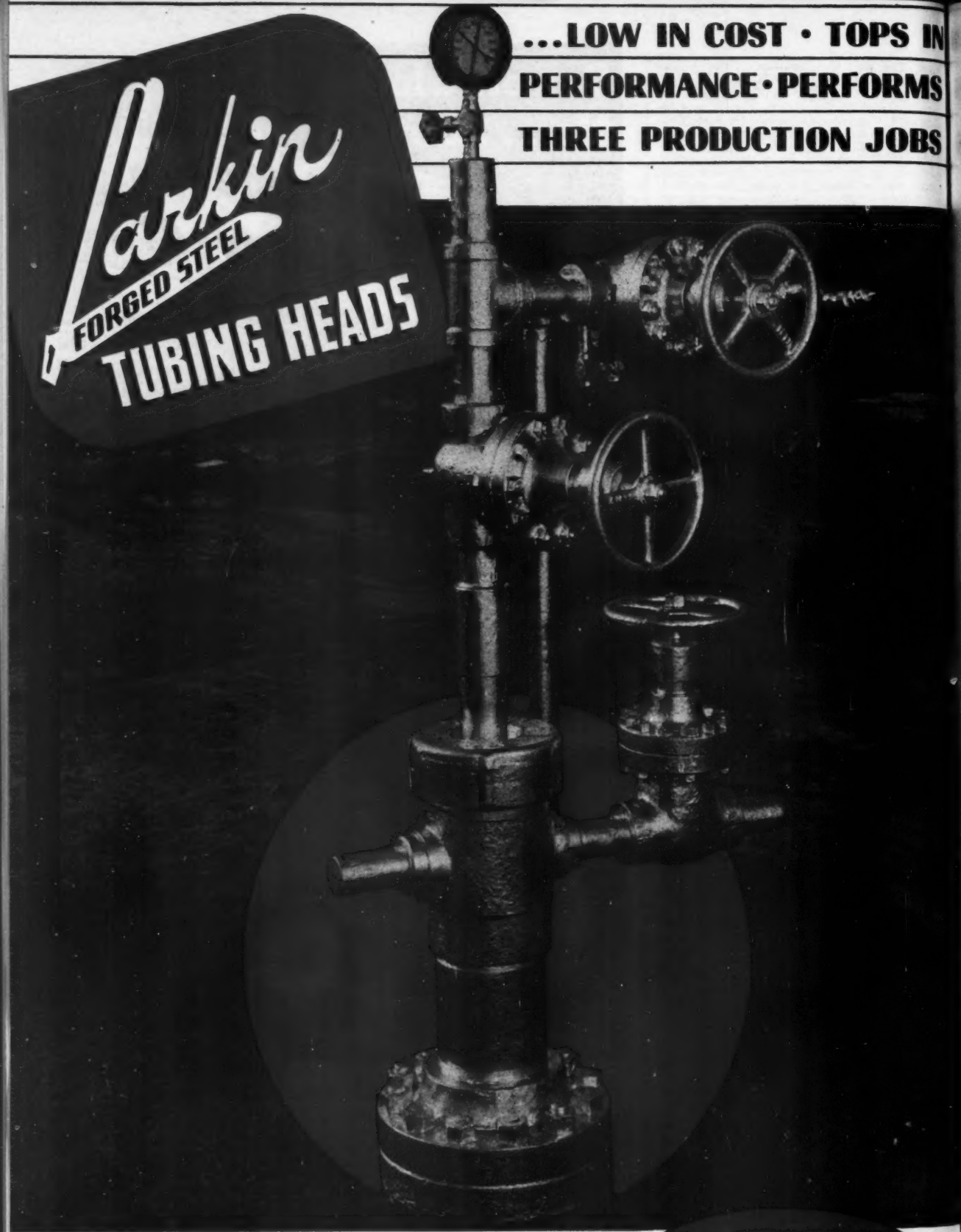

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C. Hilden 1 Gray, SE SE SW 34-17n-6w, dry in Dundee, TD 4,055 ft.

Livingston County, Genoa Township: Panhandle Eastern Pipeline Co. 1 Blanche E. Beurmann, communitized, SW NE NE 34-2n-5e, dry in Guelph, TD 4,343 ft.

Newaygo County, Denver Township: Admiral Oil Corp. 1 William C. and Hazel B. LaPrad, SE NW SW 3-14n-14w, dry, TD 1,525 ft.

Van Buren County, Keeler Township: Ohio Oil Co. 1 Louis Kehrer et al, SW NW NW 29-4s-16w, dry in Traverse limestone, TD 893 ft.

N. CENTRAL TEXAS

Wichita County Test Shows Both Oil and Gas

WICHITA FALLS.—Good show of both oil and gas was reported as cleaning out progressed at the new Strawn sand strike for southern Wichita County. W. H. Hammon and Warren Oil Corp. 1-A Cole, Block 10, Palo Pinto County School lands, 6 miles north of Holliday, drilled to 4,042 ft., casing was set at 3,295 ft. and pay shot with 180 qt. from 3,949-85 ft. Consolidated Oil Co. 3 Alice Daves, Block 14, League 2, Denton County School lands, Caddo discovery 2 miles southwest of Taylor Corner, on a 4-hour test from 5,184-89 ft. through ¾-in. choke on tubing flowed 180 bbl. of oil. It is still testing.

Grisham-Hunter Corp. 5 R. A. Brown, Block 1613, TE&L Survey, wildcat 4 miles west of Record field in southwestern Throckmorton County, was drilling below 4,347 ft. in Caddo lime with no shows so far in that section. Eight miles southwest of Throckmorton, Warren 1 J. T. Davis, Block 163, BBB&C Survey, a 5,000-ft. wildcat was drilling at 3,580 ft. in shale and sand.

Cities Service Oil Co. 1 Terrell, C. W. Egery Survey, an east offset to a north extension producer in Chico pool of northwestern Wise County, had a good flow of oil on a drill-stem test. On a 137-minute test from 5,288-5,314 ft. there was gas in 6½ minutes. Oil flowed in 77 minutes at the rate of 396 bbl. of oil daily, with gas-oil ratio of 390-1. It is reported the well will be deepened 60 to 80 ft. and further tests will be run.

The second well in King (Flippin) pool 3 miles south of Merkel, Taylor County, Sojourner Drilling Co., Ltd., 1 Sealy-Smith Foundation, has been completed on pump for 86.03 bbl. of 43°-gravity oil in 24 hours. Pay is from 2,498-2,502 ft.

Davon Oil Co. of Oklahoma City will drill a wildcat 4 miles north of Joplin pool in southeastern Jack County. It is 1 W. J. Dees, 400 ft. from northwest and northeast lines of the George Taylor Survey. It is scheduled to drill to 5,500 ft. or the Ellenburger.

W. O. Russell 1 Harris, 150 ft. from most northerly north line and 220 ft. from most easterly east line of SP Survey, A-1000, is a new 2,000-ft. wildcat in Cooke County. It is 2 miles west of Hood and 1½ miles east of the discovery and lone producer in Atcheson pool opened by Phillips Petroleum Co.

J. F. Baker of Breckenridge, Tex., will drill 1 W. J. Harrison, 425 ft. from north line and 330 ft. from east line of TE&L Survey 1407, 5 miles northwest of Caddo, Stephens County. This is an attempt for new deep production in the old Hohertz pool.

In Eastland County 7 miles west of Gorman, T. A. Kirk will drill 1 J. W. Mosley, a 3,200-ft. rotary test offsetting an old gas well. It is 1,730 ft. from east line and 330 ft. south of the river in Section 25, D&DA Survey.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) SUCCESSFUL WILDCATS

Archer County: S. D. Johnson et al 1 J. L. Prideaux, Sec. 1868, TE&L Sur., 8 mi. SE Windthorst, pumped 73 bbl. 43°-grav. oil day, pay 3,007-17 ft., TD.

Taylor County: Sojourner Drlg. Co. 1 Sealy Smith Foundation, Blk. 9, Lge. 146, Grimes CSL, pumped 78 bbl. 43°-grav. oil a day, TD 2,502 ft.

Wichita County: Consolidated Oil Co. 3 Alice Daves, Blk. 14, Lge. 2, Denton CSL, 7 mi. SW Wichita Falls, flowed 1,050 bbl. 42°-grav. oil a day, Caddo 5,182 ft., pay 5,184-98 ft., TD.

NORTH CENTRAL TEXAS (DISTRICTS 9 & 7-B) WILDCAT FAILURES

Archer County: W. B. Hamilton 1 D. Strange, Lot 31, Blk. 5, Clark & Plumb Sur., 5 mi. SE Archer City, dry, TD 1,213 ft.

W. B. Hamilton 2 D. Strange, Lot 31, Blk. 5, Clark & Plumb Sur., 5 mi. SE Archer City, dry, TD 1,134 ft.

G. E. Kadane & Sons 1 W. C. "HH," J. Poitevent Sur. A-351, 3½ mi. NE Dundee, dry, TD 1,751 ft.

G. E. Kadane & Sons 1 W. C. "II," Wm. Mayer Sur. A-273, 2 mi. NE Dundee, dry, TD 1,657 ft.

H. A. Mills & V. N. Mills 2 D. L. Wolf, SPRR Sur. 1, A-415,, 6 mi. NE Megargel, dry, TD 1,407 ft.

Staley Oil Co. 1 Wayne B. Ray, W. C. Winters Sur. A-663, 11 mi. W Archer City, dry, TD 1,500 ft.

Sunshine & Gutow 1 A. M. Carter, SPRR Sur. A-426, 5 mi. SW Holliday, dry, TD 1,800 ft.

Clay County: Carl T. Anderson 1 H. Franks, Blk. 20, Hopkins CSL, 2½ mi. NE Deer Creek, dry, TD 4,673 ft.

Coleman County: L. H. Choate & Russell Maguire 1 J. H. Livingston, J. D. Waters

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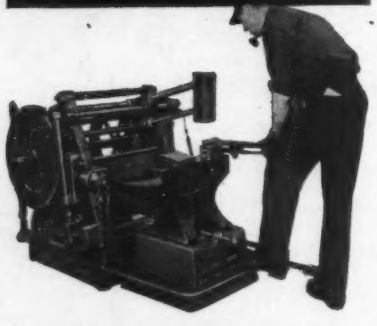

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Sur. 208, 7 mi. SW Gouldbusk, dry, TD 1,650 ft.

Cooke County: Kadane Griffith Oil Co. 4 S. B. Hopkins, J. M. Culp Sur. A-1350, 5 mi. SW Muenster, dry, TD 4,012 ft.

Denton County: J. J. Tyrell et al 1 Martha H. Hazsey, H. Turner Sur. A-1249, 4 mi. SW Lewisville, dry, TD 2,503 ft.

Jack County: Enright Bros. et al 1 J. T. Hunt, J. Armendaris Sur. A-27, 4 mi. S Antelope, dry, TD 560 ft.

Enright Bros. et al 1 Eva Low & Myrtle Ona Hunt, W. L. T. Britt Sur. A-1366, 4 mi. S Antelope, dry, TD 565 ft.

Taylor County: Sojourner Drlg. Co. 2 Sealy Smith, Lot 9, Lge. 146, Grimes CSL, 3 mi. S Merkel, dry, TD 2,740 ft.

Twin Oil Corp. et al 1 Carrie B. Kemp, Sec. 38, B A L Sur., 3 mi. E Abilene, Saddle Creek 1,796 ft., Flippen 1,892 ft., dry, TD 3,013 ft.

Twin Oil Corp. et al 1 Nath White, Se. 46 B A L Sur., 3 mi. E Abilene, Flippen 1,762 ft., dry, TD 2,616 ft.

Wise County: Neeld & Hood Drlg Co. 1 E. Thomas, Blk. 27, Matagorda CSL, 3 mi. S Bridgeport, dry, TD 1,350 ft.

MISSISSIPPI

Possibility of Sparta Sand Production Seen

JACKSON.—The possibility of the first Sparta sand production in Mississippi arose last week as a result of shows encountered in Kemp-Gillster-Vaughey-Hodge 3 V. T. Craig Estate, Section 83-7n-2w, in LaGrange field, Adams County.

The well was drilled to 6,285 ft. through the Wilcox zones which produce in the field, and a good showing was obtained on electric log 6 ft. below the top of the Sparta between 3,122-38 ft. Operators planned to test near the Baker (Wilcox) horizon before coming back up the hole and perforating and testing the possible new zone.

No. 3 V. T. Craig Estate is located in the northeast part of LaGrange field. Nearest Sparta production is in Louisiana at Lake St. John field about 15 miles northwest. Main producing horizon at Lake St. John is the Tuscaloosa.

Walter E. Sistrunk 1 Ralph Stanley, Section 8-9n-7w, was completed on pump with an initial gage of 180 bbl. a day with less than 3 per cent B. S. and W. Gravity of the oil is 19.6°. The well is northeast of Yellow Creek field in Wayne County, and the nomenclature committee of the Mississippi Geological Society has recommended the name Yellow Creek-East for the discovery.

Another Mississippi wildcat, Union Oil Co. of California 1 J. S. Wagner, was running log after drilling to a total depth of 9,799 ft. Coring was from 9,548-9,692 ft., and top of the Tuscaloosa Massive was found at 6,660 ft. The test was reported 11 ft. higher structurally than the nearest well in Fayette field in Jefferson County. Recovery was salt-water sand.

Eight locations were made last week in Mississippi, and two each in Alabama and Florida. The Alabama locations were in Geneva and Washington counties; the Florida locations, in Collier and Suwannee. Mississippi locations were announced for Adams County, four locations; Wayne County, three locations, and Lincoln county one location.

MISSISSIPPI SUCCESSFUL WILDCAT

Wayne County: Walter E. Sistrunk 1 Ralph Stanley, NE NW 8-9n-7w, TD 5,507 ft., perf. 4,845-53 ft. and 4,925-38 ft., IP pumped 180 bbl. a day rate, 3 per cent BS&W, 19.6° gravity.

MISSISSIPPI WILDCAT FAILURE

Jefferson County: The California Co. 1 W. J. Colbert, Sec. 21-8n-1w, dry, TD 10,300 ft.

Sharkey County: Carter Oil Co. 1 F. B. Houston Est., 1-10n-7w, dry, TD 3,904 ft.

FLORIDA WILDCAT FAILURE

Gadsden County: D. E. Hughes 1 Clara McDonald, 7-2n-5w, dry, TD 4,222 ft.

EASTERN TEXAS

Anderson County Field Extended to Southwest

DALLAS.—One-mile southwest extension to Elkhart Woodbine sand gas field of Anderson County was indicated by the Casey & Wempe 1 Rogers, William Greenwood Survey, 6.3 miles southwest of Elkhart. The well was reported to have topped a sand showing gas and distillate at approximately 5,500 ft., followed by a section of shale and 18 ft. more of sand showing gas and distillate. Humble Oil & Refining Co. 1 Milner, J. F. Martin Survey, in the Fosterville area of northeastern Anderson, was drilling below 6,621 ft.

A test was being made on a soft section drilled in the middle Rodessa from 8,929-44 ft. of Sanders & Murchison 1 DuPuy, Wm. Ashmore Survey, wildcat ⅞ mile northwest of Avant. Core of the Upper Rodessa recovered 9 ft. of shale and lime with no show.

Humble 1 Sackett, V. Tejeda Survey, southern Smith County wildcat 4 miles north of Bullard, was drilling below 10,519 ft. in the basal Pettit. Delta Drilling Co. 1 Max Rice, Oliver Anderson Survey, wildcat 3½ miles southwest of Tyler, was drilling below 7,020 ft. Top of Comanchean was 6,080 ft., elevation 533 ft.

Humble 1 McWatters, Lamb Survey, deep test in the Donnie sector of Freestone County, was reported running casing with total depth of 16,255 ft. Information is being withheld on the wildcat expect as to drilling depth.

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Survey, 7½ miles northeast of Lufkin, Angelina County, is a failure at 6,741 ft. The 2 Holton topped the Edwards at approximately 6,051 ft. and found no commercial shows. This is the third failure for the Lufkin area.

Union 1 D. J. M. Travis, Thos. Quevedo Survey, wildcat 3 miles southeast of Mt. Selman, Cherokee County, was drilling below 5,629 ft. Comanchean lime was topped at 5,100 ft.

EAST TEXAS (DISTRICTS 5 & 6)
SUCCESSFUL WILDCAT

Wood County: Billy Bridewell & F. R. Jackson 1 McAlester-Atlatl, J. Crawford, Jr., Sur., 1 mi. E Alba, pumped 48 bbl. 15°-grav. oil a day from open hole, TD 4,125 ft.

EAST TEXAS (DISTRICTS 5 & 6)
WILDCAT FAILURES

Angelina County: Union Producing Co. 2 Bolton, Vincent Michelli Sur., 7½ mi. NE Lufkin, dry, TD 6,741 ft.

Hopkins County: Peveto & Byars 1 W. D. Kennedy, Nacadoches Univ. Sur., 3 mi. W Como, Woodbine 4,442, dry, TD 6,412 ft.

Leon County: Byrd-Frost, Inc., 1 J. L. Nash, Allen C. Bullock Sur., 2 mi. NW Leona, Austin 6,792 ft., Woodbine 7,480 ft., Buda 7,875 ft., dry, TD 7,901 ft.

General Crude Oil Co. 1 Edward F. Swift Est., Wm. Parmer Sur., 3½ mi. NE Eunice, Austin 6,007 ft., sub-Clarksville 6,333 ft., dry, TD 7,290 ft.

Navarro County: Hunt Oil Co. 1 E. E. Hamilton, F. R. Kendall Sur., 3 mi. W Corsicana, Pettit 4,557 ft., Travis Peak 4,625 ft., dry, TD 6,674 ft.

PERMIAN BASIN

Ector County Test Ready For Completion

MIDLAND.—Preparations were being made to complete a new Ector County discovery, Cities Service Oil Co. 1 Foster, Section 9, Block 43, T-3-S, T&P Survey. The well is 7 miles southwest of Odessa and nearly 3 miles southwest of South Cowden field. It was drilled to the San Andres and plugged back to 4,215 ft. to test the Grayburg, flowed 264 bbl. of oil and 41 bbl. of drilling fluid on the last 24-hour test. The flow was believed to be through tubing. Acid was used.

Cities Service 1-Y University, Section 13, Block 13, University lands, extended Wolfcamp production in Shafter Lake pool of Andrews County 1 mile north when it flowed 41.6°-gravity oil on a drill-stem test from 8,500-66 ft. It flowed at the rate of 61.75 bbl. hourly on the 2½-hour test. Open flowing pressure ranged from 1,500 to 2,525 lb. Shut-in pressure after 20 minutes was 3,100 lb. Gas-oil ratio was 700 to 1. Drilling continued below 8,623 ft. in lower Permian lime and shale. It is to be drilled to the top of the Pennsylvanian and an electrical survey made before drilling ahead to the Devonian, deepest producing horizon in the Shafter Lake area. Placid Oil Co. 1 Nix, Section 21, Block A-47, PSL Survey, Clear Fork prospect 2½ miles south of the Fullerton area of Andrews County, continued pumping to test. Drilled to 7,455 ft., it pumped 107 bbl. of oil and the same amount of water during the last 24 hours reported.

Cole-Darden Oil Co. and Westlund & Johnson, Inc., 1 Rufus T. Foster, Section 26, Block 13, T&P Survey, 3½ miles northwest of the opener of Marvin pool in southeastern Sterling County, ran a 5½-hour drill-stem test from 4,206-4,462 ft. Recovery was 31 stands of drilling mud, the bottom 12 stands heavily cut with gas and oil. Samples and drilling time indicated the oil and gas came from 4,267-4,305 ft. Top of the Wichita-Albany was reported 122 ft. high to the Marvin discovery 7½ miles south of Sterling City. Ray Albaugh and Progress Petroleum Co. 1 Nellie Parramore, wildcat in Section 203, Block 29, W&NW Survey, in extreme northwestern Sterling, was drilling below 4,330 ft. in lime. Open 2½ hours on a drill-stem test from 4,223-88 ft., recovery was 18 stands of slightly gas-cut drilling mud with a trace of oil and a show of water in bottom.

Slick-Urschel Oil Co. et al 1 A. E. Gordon, Section 47, Block Y, CCSD&RGNG Survey, ¾-mile northwest extension to the one-well Benedum Ellenburger pool of Upton County, was completed through open hole from 11,410-11,465 ft., flowing 882 bbl. of 60.3°-gravity oil, or distillate. Test was based on an actual flow of 514.49 bbl. of oil in 14 hours. Gas-oil ratio is 3,960 to 1. Slick-Urschel et al 1 W. M. Standifer, Lot 3, P. B. Scott Survey, southwest offset to the discovery, based the Ellenburger at 12,465 ft. Various sections of the Ellenburger, topped at 11,068 ft., will be tested. On a 2-hour drill-stem test from 12,305-12,456 ft., recovery was 10 stands of water blanket, 3 of drilling mud, 6 of gas-cut mud, and 54 of black salty water.

Republic Natural Gas Co. 1-E-A Rosa Halff Burnett, Section 40, Block Y, TC Survey, 2 miles north of Benedum pool, was drilling plug from 7-in. casing, cemented at 11,590 ft., total depth, in the Ellenburger topped at 11,580 ft.

Richardson & Bass 1 H. F. Neal and A. D. Neal, Section 9, Block Y, GC&SF Survey, eastern Upton wildcat 7 miles northwest of the opener of Benedum field, topped the Devonian at 10,509 ft., 7,783 ft. below sea level. It was drilling ahead at 10,515 ft. in Devonian chert.

Honolulu Oil Corp. 1 T. S. Riley Estate, Section 123, Block G, WT Survey, Gaines County wildcat 5½ miles east of the north portion of Seminole pool, drilled to 7,522 ft. It was plugged back to 5,585 ft. and was perforating casing to test the San Andres which showed some oil when drilled. W. H. Black Drilling Co. 1 James B. Riley, southwestern Gaines wildcat, Section 259, Block G, WTRR Survey, recovered 600 ft. of drilling mud only on a 60-minute drill-stem test from 5,015-5,100 ft. It was drilling at 5,142 ft. in San Andres.

WEST TEXAS (DISTRICTS 8 & 7-C)
SUCCESSFUL WILDCATS

Andrews County: Continental 1 Univ. C-25, Sec. 25, Blk. 14, Univ., pumped 5 bbl. 32°-grav. oil a day, pay 4,730-70 ft., TD.

Stanolind 1 Lotus Oil, Sec. 18, Blk. A-48, PSL, 14½ mi. NW Andrews, pumped 21 bbl. 33°-grav. oil a day, top pay 6,680 ft., TD 7,021 ft.

Winkler County: Gulf 125-E Keystone Cattle, Sec. 29, Blk. B-2, PSL, pumped 162 bbl. 34°-grav. oil a day, pay 6,569-75 ft., TD 11,502 ft.

WEST TEXAS (DISTRICTS 8 & 7-C)
WILDCAT FAILURES

Culberson County: Jimmy Mills et al 1 J. H. Fisher, Sec. 12, Blk. 110, PSL, dry, TD 300 ft.

Pecos County: Culbertson & Irwin, Inc., 1 Iowa Realty Trust 'A,' Sec. 131, Blk. 10, H&GN Sur., dry, TD 1,493 ft.

TEXAS PANHANDLE WILDCAT FAILURE

Deaf Smith County: Humble 1 Stanbaugh, 20-3n-1e, 38 mi. W Hereford, dry, TD 6,675 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Texas Pacific Coal & Oil Co. 39-A State, 9-22s-36e, opening Pennsylvanian lime production on the southeast side of the shallow South Eunice pool of southeastern Lea County, is drilling below 10,983 ft. in shale after core from 10,949-72 ft. recovered shale with no shows. Pennsylvanian was topped at 12,915 ft. Core from 10,934-944 ft. recovered 10 ft. of sand, the upper 3 ft. showing oil. On a 2½-hour drill-stem test from 10,895-944 ft. there was gas at the surface in 6 minutes, mud in 75 minutes, and oil in 79 minutes. When it was turned into tanks at the end of 1½ hours,

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the well flowed 14.6 bbl. of 40°-gravity oil in 1 hour. Gas-oil ratio was 935 to 1. The shallow wells in this area produce from above 4,000 ft. This is the first oil to be found in southeastern New Mexico from a Pennsylvanian formation.

Humble Oil & Refining Co. will drill a 6,500-ft. wildcat in southwestern Chaves County. The well will be 660 ft. from the north and east lines of 30-15s-22e. It is 8 miles north of a recently completed 7,011-ft. failure, W. H. Black Drilling Co. 1 Shilneck, 24-16s-20e, which was carried to granite. Two more new wildcats for the county are Magnolia Petroleum Co. 1 Turney-Federal, 660 ft. from the north and east lines of 23-14s-28e, 30 miles southwest of Roswell, a 7,500-ft. venture, and Martin Yates, Jr., et al 1 Kime, 1,880 ft. from the north and east lines of 28-15s-28e, 20 miles east and slightly north of Artesia, to be drilled to 3,500 ft. with cable tools.

OKLAHOMA

Southeast New Hope Has Good Extension

SINCLAIR PRAIRIE OIL CO. has extended Southeast New Hope pool by about ½ mile with production at 1 Adair, 10-4n-3w, Garvin County. The well flowed 620 bbl. of 42.5°-gravity oil in 24 hours through various chokes. Flow was for 5 hours through ¾-in. choke, 3 hours through ½-in. choke, and 16 hours through 20/64-in. choke. Production is through perforations opposite Pennsylvanian sand at 6,903-28 ft. and the 24-hour test flow was accompanied by 400,000 cu. ft. of gas.

Sohio Petroleum Co. is testing the east offset to the discovery well of Eola pool. The well, Sohio 1 Dunlap, SE SW NE 17-1n-2w, Garvin County, was drilled to 11,906 ft. and plugged back to 10,805 ft. in the McLish. Perforations were made opposite sand at 10,644-84 ft. and well flowed 182 bbl. in 24 hours through various sized chokes. The discovery well, Sohio 1 Howard, was first completed in the Bromide, later deepened to the McLish, and again plugged back to the Bromide. Sohio has another well, 1 Vaughn, SE NE SW of the same section, where preparations are being made to test the Bromide.

In the area about 5 miles northwest of North Cement pool, Ray Stephens and Gulf Oil Corp. are preparing to start coring at 1 Lawrence, C SW SE 21-7n-9w, Caddo County, after topping a soft sand at 10,531 ft. in lower Pennsylvanian. The discovery well of North Cement pool produces from Marchand sand at 10,630-55 ft.

B. B. Blair is testing 2 Rollings, SW NE NW 9-22n-1w, Noble County, to push production in Southwest Ceres further to the southwest. The well made 314 bbl. in 6 hours through ¾-in. choke. This is the fourth producer for Southwest Ceres and Tide Water Associated Oil Co. has two tests going at the northeast end of the string in an effort to establish a link with South Ceres.

North Alma pool in Stephens County has a good extension to the north at Samedan Oil Corp. 1 Trotter, NW SE SE 9-1s-4w. Operator has tested the two lower sections of the Springer for a flow of about 3 bbl. per hour and will perforate opposite the upper section at about 5,251-60 ft. for further tests. Total depth is 5,425 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Republic 1 Masters, SE NW SW 25-3n-3w, flowed 201 bbl. of 62.9°-gravity distillate per day from Gibson sand at 7,085-7,100 ft.

Grant County: British-American 1 Cornell, NE NE NW 24-28n-3w, flowed 178 bbl. of oil per day through 10/64-in. tubing choke from Wilcox at 4,685-93 ft., TD.

Hughes County: Horner 1 Williams, SW NW NW 6-7n-9e, gaged 1,000,000 cu. ft.

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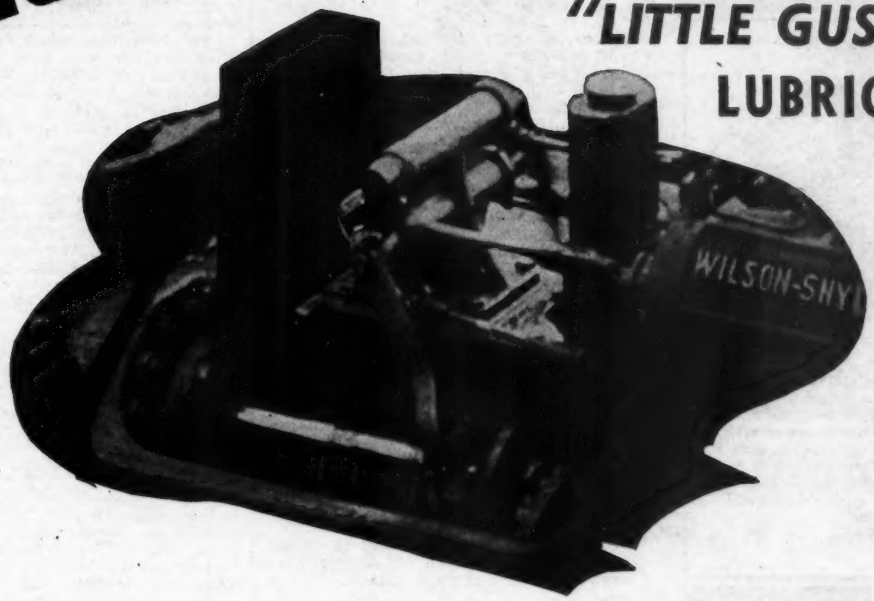

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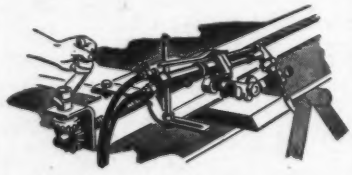

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of gas per day from Bartlesville at 2,512-18 ft., TD 2,036 ft.

Oklahoma County: Denver 1 Meeker "C," NW NE SE 2-13n-4w, flowed 44 bbl. of oil per day through ¼-in. tubing choke from Chimney Hill at 6,582-6,700 ft.; Checkerboard 5,522 ft., oolitic 5,696 ft., Oswego 6,192 ft., TD 6,700 ft.

Pawnee County: Wadsworth 1 Blanchard, SE SE NW 25-20n-6e, gaged 3,500,000 cu. ft. of gas from Skinner at 2,684-98 ft.; Oswego 2,420-50 ft. with show of oil, TD 2,703 ft.

Stephens County: Palmer 1 Leard-Amerada, SE NE NW 31-2n-5w, flowed 25 bbl. of 35°-gravity oil per day from sand at 10,039-78 ft., TD 10,144 ft.

OKLAHOMA WILDCAT FAILURES

Garvin County: Sohio 1 Halbrook, NE SW SW 20-1n-1w, dry, TD 10,051 ft., basal Pontotoc & Dornick Hills 8,150 ft., Springer 9,384 ft.

Logan County: Wood River 1 Turner, NW SW NW 3-15n-1e, dry, TD 5,518 ft., Hogshooter 3,780 ft., Checkerboard 40,050 ft., Oswego 4,523 ft., no Bartlesville, Mississippi lime 4,930 ft., Woodford 4,998 ft., no Misener, Hunton 5,032 ft., Sylvan 5,158 ft., Viola 5,260 ft., Wilcox 5,340 ft., second Wilcox 5,468 ft.

Noble County: Gutowsky 1 Welch, NW NW SE 9-22n-1w, dry, TD 4,777 ft., Avant 3,280 ft., Layton 3,660 ft., Mississippi lime 4,740 ft., lower Hoover 2,447 ft., Oread 2,600 ft., Tonkawa sand 2,834 ft., Tonkawa lime 2,920 ft., Hogshooter 3,815 ft., Checkerboard 4,108 ft., Oswego 4,208 ft., Verdigris 4,447 ft.

Osage County: Ohio 1 Osage, SE SW SW 20-24n-4e, dry, TD 2,610 ft.

Woods County: Atlantic 1 Murray, C NW SW 24-26n-15w, dry, TD 7,378 ft., Viola 6,674 ft., Wilcox 6,826 ft., second Wilcox 6,874 ft., Arbuckle 7,106 ft.

ute drill-stem test of the Arbuckle at 3,870-75 ft. recovered 305 ft. of gas-cut oil. Top of the Arbuckle was called at 3,868 ft. and casing has been set to 3,870 ft. for further tests.

For the week, 58 new locations were announced with Barton and Rice counties reporting 7 each. Rooks County had six new spots followed by Butler and Ellis with five each.

KANSAS SUCCESSFUL WILDCATS

Edwards County: Cohen 1 Bright, NW NW SW 1-24s-16w, gaged 15,000,000 cu. ft. of gas per day from Lansing-Kansas City at 3,686-3,706 ft., TD 3,952 ft.

Rush County: Armer 1 Rodie, NW NW NW 27-18s-16w, pumped 12 bbl. of oil per day from Reagan at 3,570-91 ft., TD 3,595 ft.

KANSAS WILDCAT FAILURES

Barton County: National Co-Operative Refinery Assoc. 1 Werner, NW NW NW 24-19s-12w, dry, TD 3,400 ft.

Cowley County: Weidemann 1 Cranston, SE SE NW 20-30s-7e, dry, TD 2,798 ft.

Ellis County: Michaux 1 Chrisler, SE SE SE 25-11s-16w, dry, TD 3,558 ft.

Graham County: Phillips et al 1 Harlan, SE SE NE 4-10s-21w, dry, TD 4,025 ft.

Reno County: Kaiser 1 Yarmer, SE SE SE 1-25s-10w, dry, TD 4,360 ft.

Rooks County: Bay 1 McConnell, SW SW SE 25-6s-18w, dry, TD 3,548 ft.

Sedgwick County: Justice Carlock 1 Sieg, SE SE NW 9-25s-1e, dry, TD 3,100 ft.

NEBRASKA WILDCAT FAILURES

Nemaha County: Wakefield et al 1 Lunzman, SW SW NW 9-5n-13e, dry, TD 2,336 ft., Topeka 740 ft., Lansing-Kansas City 1,012-1,310 ft., basal Mississippi lime 2,032 ft., Hunton 2,264 ft.

Richardson County: Palenski 1 Thomas, SW SW NE 2-2n-15e, dry, TD 2,478 ft., Topeka 550 ft., Lansing-Kansas City 900-1,235 ft., Mississippi lime 2,126-2,240 ft., Hunton 2,463 ft.

KANSAS

Sedgwick County Gets Possible Pool Opener

SEDGWICK COUNTY has another possible new pool at J. P. Gaty 1 Broers, CNL SE SW 5-26s-2e. The well, located about 1 mile northwest of Fairview pool, found 44°-gravity oil in the Basal Pennsylvanian sand (Burgess) and had a fill-up of 1,400 ft. of oil in 25 minutes from total depth of 2,974 ft. The sand was cut at 2,973 ft. and casing was set at 2,968 ft. The well is expected to make about 1,200 bbl. per day. Production in Fairview pool is from the Mississippian while production in the new well is from sand above the Mississippi chat.

National Cooperative Refinery Association 1 Smith, SE SE SW 8-9s-18w, Rooks County, is in the process of being completed as the opener of an Arbuckle pool. Top of the Arbuckle was called at 3,491 ft. and after the plug was drilled to total rotary depth of 3,496 ft., the well swabbed 35 bbl. per hour for 4 hours. The new pool is located between Paradise Creek pool and Southeast Barry pool.

Barber County has a new gas pool opened by Great Lakes Carbon Corp. 1 Werner, SW SE SE 21-30s-14w, with production from the Simpson sand, topped at 4,582 ft. Production is estimated at about 5,000,000 cu. ft. per day. Total depth is 4,594 ft.

An offset to the discovery well of Rolling Green pool at the south edge of Barton County had a good show of oil and gas. The well, Cardinal Oil Co. 2 Aldrich, NW SW NW 36-20s-13w, had a strong blow of gas and recovered 780 ft. of oil in a 40-minute drill-stem test of the Lansing-Kansas City at 3,245-2,316 ft. Casing was set to 3,246 ft.

Bennett & Roberts Drilling Co. and Delta Production Co. are testing 1 Kelly, NW NW SE 35-23s-12w, Stafford County. A 30-min-

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LA.-ARK.

New Pay Opened In Driscoll Field

SHREVEPORT.—A new pay was opened for Driscoll field of Bienville Parish by Barnsdall Oil Co. 1 Davis Bros. Lumber Co., 7-16n-4w. It was completed through perforations from 6,760-6,800 ft. and 6,810-40 ft. in the Pettit zone. Initial production was 10,800,000 cu. ft. of gas plus 10 bbl. of distillate per million cubic feet. Total depth was 11,330 ft. in the Cotton Valley.

Stanolind Oil & Gas Co. and Continental Oil Co. 1 Viola Mitchell Unit, 31-23n-9w, deep test in Shongaloo field of Webster Parish, cored from 10,494-10,452 ft. and recovered 27 ft. of shale and sand with no shows. It was drilling below 10,482 ft. in Cotton Valley. Barnsdall 1 Robert Sykes, 1-22n-9w, 11,500-ft. test 2 miles east of Shongaloo field, was coring ahead after core from 8,165-67 ft. had no shows.

M. A. Halsey et al 1 Bishop-Lewis "Unit," 30-20n-6w, deep test in Athens field of Claiborne Parish, was drilling below 7,868 ft. in hard shale, believed to be in the Travis Peak. A new test for Claiborne south and west of the old Homer field is Jones and Linam 1 Joe Camp, near the Webster Parish line. It is 660 ft. south and 660 ft. east of the northwest corner of 22-20-8w. There has been considerable lease interest in this area within the past few months.

E. C. Laster et al 1 Perkins-McLaurin, 25-15n-14w, wildcat 6½ miles northeast of Kickapoo field, DeSoto Parish, was drilling below 4,845 ft. Union Producing Co. 1 Mansfield Hardwood Lumber Co. 4-11n-11w, 7,500-ft. test on the south edge of Bull Bayou field, was drilling below 4,423 ft. in massive anhydrite.

In Arkansas, Stanolind 1 Union Saw Mill, 18-19s-24w, in the old Bradley field of Layfette County, was waiting on cement to run electrical survey. Total depth is 6,404 ft. in the Glen Rose. Stanolind et al 1 Bodcaw Lumber Co., 29-19s-23w, wildcat 11 miles south of McKamie field, was drilling below 8,555 ft. in the Cotton Valley. DeSha Basin Corp. 1 M. A. Merrill, 13-9s-9w, 10 miles southeast of Rison, Cleveland County, was drilling ahead at 4,200 ft. Carter Til Co. 1 J. F. Ethredge, 20-19s-16w, 3 miles northwest of Junction City, Lt., was drilling in the Cotton Valley at 6,651 ft. Two failures for Nevada County are W. L. Pickens 1 Almond, 16-3s-22w, at 4,335 ft. in the Smackover and Tide Water-Seaboard Oil Co. 1 Q. A. Mitchell, 16-14s-21w, 1 mile southwest of Irma field, dry at 3,500 ft. in the Travis Peak.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Bienville Parish: Barnsdall Oil Co. et al 1 Davis Bros. Lbr. Co., 7-16n-4w, new pay Driscoll field, 10,800,000 cu. ft. gas per day, plus 10 bbl. distillate per million cubic feet gas, pay 6,760-6,800 ft. and 6,810-40 ft. Pettit, TD 11,330 ft. Cotton Valley.

NORTH LOUISIANA WILDCAT FAILURES

Catahoula County: F. R. Jackson et al 1 B. E. Trunzler, 9-7n-6e, dry, TD 6,260 ft.

Madison County: Magnolia 1 Garner W. Green, 15-17n-11e, Paluxy 3,542 ft., dry, TD 4,014 ft.

Richland County: Union Prod. 1 G. W. Bolton, 20-17n-7e, Glen Rose 2,550 ft., dry, TD 2,854 ft.

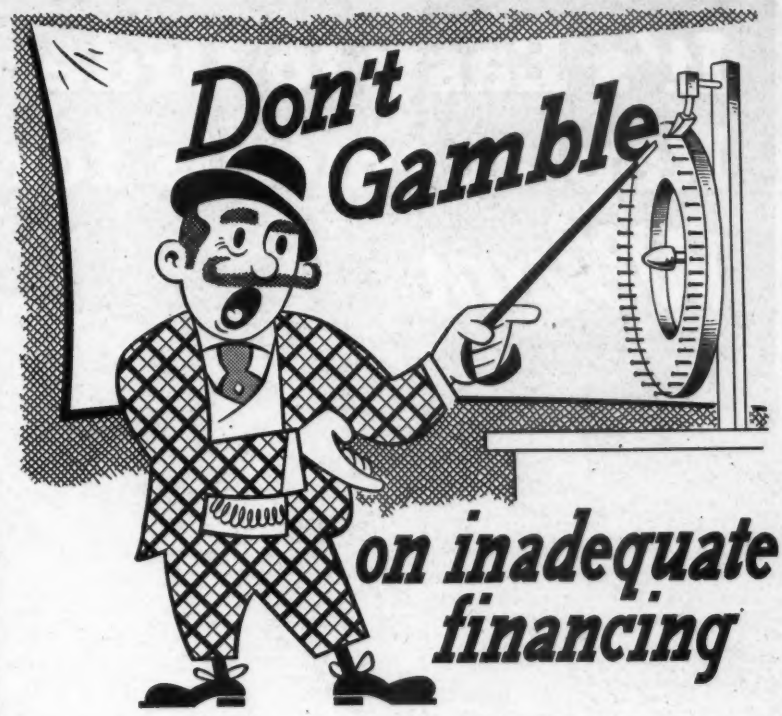
Union County: Petty, McCain, Richards et al 1 C. H. Gulley, 16-23n-13, dry, TD 2,338 ft.

ARKANSAS WILDCAT FAILURES

Little River County: K. E. Merren et al 1 W. P. Phelps, 6-13s-31w, dry, TD 1,457 ft.

Nevada County: W. L. Pickens 1 Almond, 16-3s-22w, Buckner 4,020 ft., dry in Smackover, TD 4,355 ft.

Tide Water-Seaboard 1 Q. A. Mitchell,



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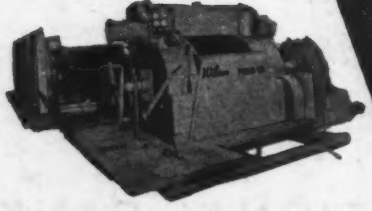

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16-14s-21w, 1 mile SW Irma field, dry in Travis Peak, TD 3,500 ft.

SOUTHWEST TEXAS

Caldwell Test Produces 40 Bbl. Daily on Pump

CORPUS CHRISTI.—Production at the rate of 40 bbl. daily on the pump was reported with the completion of Dave Kelton and Hubert Brazelton 1 Charles T. Kelley, wildcat 5 miles southeast of Lockhart in Caldwell County.

Producing formation was the Austin chalk which was topped at 1,929 ft. Edwards lime was encountered at 2,400 ft. No shows were encountered in the Edwards to a total depth of 2,520 ft., and the hole was plugged back to 2,020 ft. The well swabbed oil from open hole, was then drilled out to 2,170 ft., and is continuing to test.

A Texas Co. wildcat in Starr County, 1 Bloomberg, appeared a likely gas-condensate producer after drill-stem tests at the 6,250-ft. level On one test from 6,256-66 ft. with ¼-in. choke, recovery was 560 ft. water cushion cut with gas and condensate and 30 ft. mud; bottom-hole pressure was 2,500 psi. open and 2,900 psi. closed. On drill-stem test from 6,266-76 ft. with same-size choke, recovery was 450 ft. gas-condensate-cut water cushion with bottom-hole pressure of 2,050 psi. open and 3,275 closed.

The Texas Co. 1 Amando C. Garcia et al came in as a new oil discovery in northeast Duval County about 1½ miles northeast of Fitzsimmons field. Flow was 28 bbl. of 45°-gravity oil in 8 hours on initial production test with ½-in. choke and perforations from 4,498-4,505 ft. Tubing pressure was 420 psi., casing sealed. Total depth is 5,041 ft., and the well is now waiting on potential gage. The location is in the H&GN Survey 429, about 11 miles north-northwest of San Diego.

The Southwest Texas area comprising Railroad Commission Districts 1 and 4 reported 32 new locations, 22 in District 1 and 10 in District 4. Locations by counties: 7—Duval; 4—Edwards; 3—San Patricio, Starr, and Webb; 2—Atascosa and Nueces; 1—Bexar, Guadalupe, LaSalle, Zazala, Brooks, Jim Hogg, Jim Wells, and Zapata.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Duval County: Rodney & DeLange 2 J. T. Dinn, in J. Morales Sur. 454, in South Kohler gas field area, dry, TD 2,643 ft.
Southern Minerals Corp. 1 A. D. Raymond, San Pedro de Charco Redondo Gr., 3 mi. NW Conception, dry, TD 5,850 ft.

Caldwell County: O. W. Killam 1 L. Brite, Jasper Gilbert Lge., 10 mi. E. Lockhart, dry, TD 2,996 ft.

Jim Hogg County: Baldridge & King, Inc., 1 Armstrong Bros., A. Villa Sur. 90, 14 mi. SW Hebbronville, dry, TD 3,227 ft.

Jim Wells County: George W. Graham 1 C. W. Ragland, Los Presenos de Adajo Gr., 4 mi. S Alfred, dry, TD 5,284 ft.

Milam County: Roland B. Paxson et al 2 Paul Graves, E. S. O. Robertson Sur., 2 mi. W Holcomb field, dry, TD 1,853 ft.

Nueces County: Comanche Corp. 1 Stephen Swetlick, Gregorio Farias Gr., 3 mi. E Robstown, dry, TD 7,050 ft.

San Patricio County: Sam E. Wilson, Jr., 1 Hart Bros. 1¾ mi. SW Edroy, dry, TD 6,607 ft.

Starr County: Manforth Oil Co., Ltd., 1 H. P. Guerra, Tr. 77, Porc. 59, Mier Jurisdiction, 16½ mi. N Roma, 8 mi. NW El Sauz, dry, TD 1,910 ft.

Webb County: Dulaney Oil Co. 1 Mrs. Maria G. Martin, SW¼ of Augustin & Laurel Sur. 458, 1 mi. E Mirando City, dry, TD 1,902 ft.

Willacy County: Humble Oil & Refining Co. 3 Sauz Ranch-Jardin, San Juan de Carricitos Gr., 9 mi. E-NE Raymondville, dry, TD 8,170 ft.

Zavala County: Sun Oil Co. 2 D. M. Pryor et al, Antonio Aguirre Sur., A-1, 4 mi. E-NE La Pryor, dry, TD 2,873 ft.

ILLINOIS

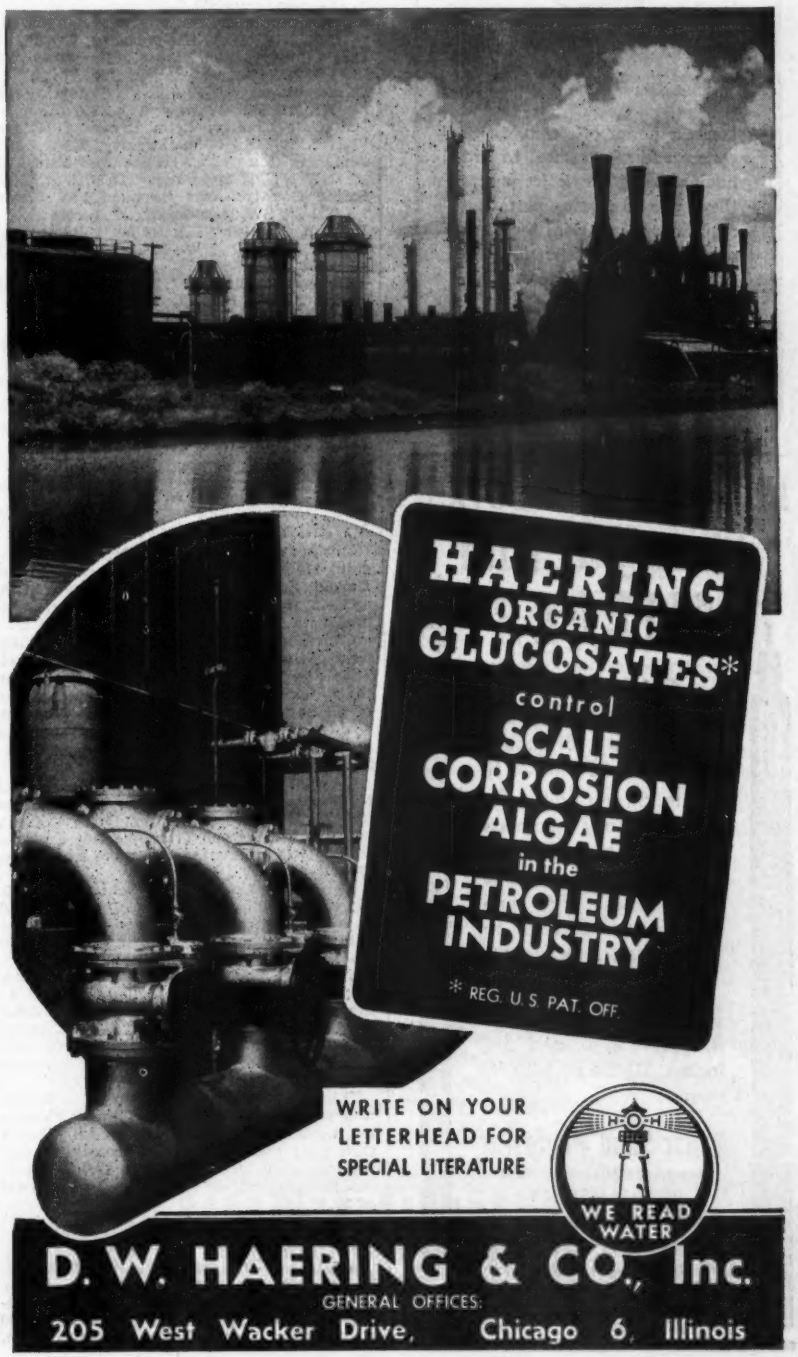
Richland County Gets Good McClosky Show

MATTOON.—Russell P. Johnson and Williams Drilling Co. have a good McClosky well at 1 John Von Almen, SE NE NW 31-5n-14w, Richland County. Operators have set casing on the McClosky after a drill-stem test at 2,999-3,009 ft. had gas in 3 minutes and flowed clean oil in 11 minutes. Bottom-hole pressure was 1,550 psi. The new well is located north of Stringtown pool.

Phillips Petroleum Co. and N. V. Duncan 2 Keepes-Pfeister Comm., NE SW NE 24-1s-14w, Wabash County, flowed 343 bbl. per day from O'Hara pay at 2,835-42 ft. to open the new pay zone. The well is just north of Lexington pool. The lime pay zone has not been acidized.

In the area between North Clay City pool and East Sailor Springs pool, Magnolia Petroleum Co. has a good Rosiclare well at 1 Bertha Mitchell, SW NW SE 5-3n-8e, Clay County. The well flowed 1,275 bbl. per day from pay at 3,012-18 ft. that has not been acidized. Total depth is 3,024 ft.

In Clark County, National Associated Petroleum is pump testing Trenton lime pay at 1 Dorsey, E½ NE SE 7-11n-14w, after



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See Composite Catalog Page 2426

perforating at 2,390-2,410 ft., 2,340-70 ft.. and 2,290-2,320 ft After treating all zones with acid, the well pumped 57 bbl. of oil in 18 hours.

In Jefferson County, A. J. Slagter, Jr., has completed 1 Modert-Budiselich, NW SW SE 22-3s-3e, with initial production of 35 bbl. of oil and 21 bbl. of water from the Aux Vases at 2,766-74 ft. Total depth was 2,865 ft.

ILLINOIS SUCCESSFUL WILDCAT

Wabash County: Olen D. Sharp 1 G. Wells, SE SW SE 29-1s-13w, IP 17 bbl., Cypress, 2,428-34 ft., TD 2,570 ft.

ILLINOIS WILDCAT FAILURES

Effingham County: Joe Dunbar 1 Cremer, SE NW SW 4-7n-7e, dry, TD 2,802 ft.
Jasper County: Robinson & Puckett 1 C. Love, C SE SE 24-7n-10e, dry, TD 2,543 ft.
Richland County: Don Slape 1 Hunley, NW NW SW 3-4n-9e, dry, TD 3,104 ft.
Joe Linzy 1 W. E. Roxroat, NW NE SE 7-4n-9e, dry, TD 3,059 ft.
Edgar County: D. F. Wright 1 J. Fenwick, NW NW NE 36-15n-14w, dry, TD 820 ft.
Clark County: Van Tarble 1 Hammond, SE NE SE 13-11n-14w, dry, TD 668 ft.
Clinton County: J. F. Finley 1 Forsythe, NW NE NE 6-2n-1w, dry, TD 1,378 ft.
Lawrence County: Ilean Brown 1 Nelson, NW NW SE 14-2n-13w, dry, TD 2,580 ft.
Jefferson County: C. E. Brehm 1 Estes, SE NW NW 17-3s-4e, dry, TD 3,103 ft.
Saline County: Ross Bartmes 1 Williams, SE SE SW 30-7s-5e, dry, TD 3,320 ft.
Wabash County: C. E. Skiles 1 Rosenberger, SE SE NW 29-1s-13w, dry, TD 2,875 ft.
Gopher Drilling Co. 1-A G. H. Schrodt, SE SE SW 1-2s-13w, dry, TD 2,719 ft.

OHIO, KENTUCKY

Big Well Struck In Morgan County

COLUMBUS.—Ackerman Development Co. struck a big well on Jos. Benanti (Courdway) in Section 12, Deerfield Township, Morgan County, a west offset to the Harold Smith. Clinton sand came in at 4,134-72 ft. and gaged 2,500,000 cu. ft. natural with 960 lb. pressure.

Chartiers Oil Co. moved 2,000 ft. southwest of its 1 Mechling, Section 8, Hopewell Township, Perry County, and drilled in the No. 2 with 890,000 cu. ft. gas, and a show of oil natural. After a 90-qt. shot the gage was estimated at 1,500,000 with no report on the oil. Clinton sand was logged at 2,685-2,710 ft.

Clay Hicks et al found the Clinton and Medina sands dry in the 3 L. G. Sims, Section 23, Bearfield Township, Perry County, and will test the sub-Trenton. They are now drilling in the Trenton limestone which was topped at 5,209 ft.

Oxford Oil Co. 4 Victor Scheibe, Lot 10, Clark Township, Coshocton County, found an oil showing in the Newburg sand at 3,161-68 ft. The well is being tested and making 30 bbl. a day natural.

Newburg pool in Congress Township, Wayne County, was extended ½ mile to the southeast by a small well on John Sartin, Section 20. Sand at 2,719-87 ft. gaged 145,000 cu. ft. natural and 430,000 cu. ft. with a show of oil after acidizing. Rock pressure was 1,010 lb.

Thirty-three locations from 16 counties was reported for the week. Perry County led with five and was followed by Knox with four and Cuyahoga, Muskingum, and Athens with three each. Cambridge field led in completions with 8 out of a total of 30.

EASTERN KENTUCKY

ASHLAND.—On the Rockcastle River uplift in Clay County, Pure Oil Co., after having had considerable trouble with shallow formations, is now drilling below 1,500 ft. on the 1 Rawlings Consolidated; 10-in. casing has been cemented at 694 ft. This is the third well in the area by Pure Oil Co. to test deeper beds on this prominent surface structure.

In Menifee County, 21-R-72, Willet Groover et al 1 Motley is drilling at 900 ft. The test is designed for deep prospects including the Knox dolomite horizon.

J. C. Kindred 1 C. C. Abner, 12-P-68, Powell County, is, to date, the deepest active drilling well in this county which is getting a considerable play due to the discovery of St. Peter gas in the southern part of the county which has been named the Furnace field. Located some 3 miles north of the field, the Abner was dry in the St. Peter but drilling is now progressing in the Knox dolomite at 2,770 ft. The Knox was topped at 2,160 ft.

WESTERN KENTUCKY

OWENSBORO.—Clarence Wood has added McClosky production in Geneva pool at 13 C. Wood fee, 16-Q-22, Henderson County. Operator set casing to 2,620 ft. and perforated at 2,600-01½ ft. with 16 shots. The hole was full of oil in 14 hours and swabbed 12 bbl. of oil per hour. From the electric log, the Barlow lime was called at 2,254-66 ft. and the St. Genevive top at 2,570 ft. Geneva pool also produces from the Waltersburg at 1,785 ft., Tar Springs at 1,869 ft., and Weiler at 2,252 ft.

Delta Drilling Co. 1 Mrs. J. F. Haleman, NE SW SW 21-M-22, Webster County, is drilling below 3,010 ft. with the McClosky due at about 3,070 ft. The well showed some oil saturation in the Paint Creek lime at 2,966-76 ft. and a 1-hour drill-stem test got 1,860 ft. of gas. This is the well which the operator expects to further evaluate the McClosky pay in the new Dixon pool.

Webster County will have another 3,000-ft. wildcat test at Ashland Oil & Refining Co. and W. G. Turbeville 1 Ray Brooks SW SW 12-L-22, about 4 miles south of Dixon, which is to start in the last week of August.

WESTERN KENTUCKY WILDCAT FAILURES

McLean County: Benedum-Trees Oil Co. 1 J. C. Schutt, SE NE SW 16-L-29, dry, TD 2,180 ft.
Webster County: I. B. Browning 1 Low Moisture Coal Co., SE SW SE 15-L-22, dry, TD 2,721 ft.

INDIANA

EVANSVILLE.—Gibson County has a good well at Illinois Mid-Continent Co. 1 McFarland-Andrews, NW SW NW 19-1s-11w, where operator is testing the Rosiclare. On an early drill-stem test, the well had gas

(Continued on page 207)

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CALIFORNIA

Development Planned For Salinas Valley

LOS ANGELES.—Indicating an increasing amount of interest in the Salinas Valley of Monterey County were reports last week that the combination of Jergins Oil Co. and North American Consolidated Oil Co. have leased an additional 15,000 acres in the San Ardo area. The property leased lies east and north of present production in the region.

The San Ardo area was first discovered to be productive by The Texas Co. late last year. The discovery well, the first commercial well in Monterey County, was good for only 85 bbl. daily, but definitely indicated the presence of oil in an area that has been prospected without success for many years. The Texas Co. has since completed several wells in the area but these have all been small producers. The Jergins-North American combination, however, entered the area a few months ago and have completed one large gas well and about three oil wells so far. Location of these wells definitely indicates that the field may possibly be a major accumulation with a gas-cap drive. The two latest completions by Jergins and North American were finished last week. These were the 76-11 Orradre, 11-23s-10e, which flowed 225 bbl. daily from a total depth of 2,643 ft., and the 62-11 Ferrini, 11-23s-10e, which made 200 bbl. daily from a total depth of 2,140 ft. The former topped the oil sand at 2,122 ft., and the latter at 1,958 ft.

The Texas Co. has made a small oil discovery in the Ciervo Anticline area of San Benito County. Following considerable wildcatting in the area, the company successfully completed its 1 Nicholas, 28-16s-12e, for 25 bbl. daily on pump. Gravity of the oil is 25° and water cut is approximately 1 per cent. Total depth of the well is 1,252 ft., and it is producing from a plugged back depth of 1,185 ft. The Texas Co. currently has a follow-up well under way a short distance west of the discovery well.

Richfield Oil Corp. has announced that the official field name for their recently discovered production in the Cuyama Valley will be the Russell Ranch oil field. That part of the productive area which lies north of the Cuyama River in San Luis Obispo County will be designated as the White Rock area of the field, and that part of the productive area south of the river in Santa Barbara County as the Russell area of the field.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, Wheeler Ridge area: Richfield Oil Corp. 63-29 KCL-Coal Canyon, 29-11n-20w, pumped 12 bbl. daily, 92 per cent cut, elev. 128 ft., TD 5,210 ft.

Los Angeles County, West Montebello area: Rothschild Oil Co. 1 Wheeler, 2-2s-12w, pumped 75 bbl. daily, elev. 540 ft., TD 2,900 ft.

Monterey County, Salinas Valley area: The Texas Co. 2 Biaggi, 12-22s-9e, comp. on pump, no prod. estimate, elev. 593 ft., TD 1,159 ft.

The Texas Co. 4 Lombardi, 27-22s-10e, pumped 32 bbl. daily, elev. 503 ft., TD 2,110 ft.

Santa Barbara County, Goleta area: Honolulu Oil Corp. 309-2 Honolulu et al, 19-4n-28w, flowed 95 bbl. daily, elev. 50 ft., TD 10,054 ft.

Jasper Petroleum Co. 1 Thomas B. Bishop Co., 7-4n-28w, comp. on pump, no prod. estimate, elev. 175 ft., TD 3,241 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Ant Hill area: D. D. Feldman 1 Feldman, 2-29s-29e, dry, elev. 711 ft., TD 3,060 ft.

Comanche Point area: Tejon Hills Oil Co. 3 Tejon Hills, 10-11n-18w, dry, elev. 1,006 ft., TD 473 ft.

Pottenger area: The Texas Co. 1 Universal, 19-30s-21e, dry, TD 4,674 ft.

Merced County, Dos Palos area: Tide Water Associated Oil Co. 48-29 Azevedo, 29-10s-12e, dry, elev. 105 ft., TD 5,544 ft.

San Luis Obispo County, Elkhorn Valley area: Frank R. Short 1 Melinda, 22-32s-22e, dry, elev. 2,648 ft., TD 1,818 ft.

CANADIAN FIELDS

Lower Cretaceous Oil Found in Leduc Field

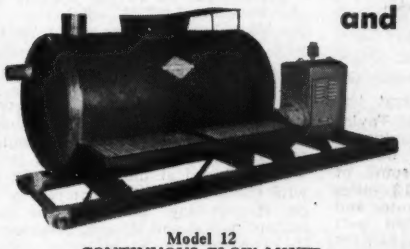
CHATHAM.—A potentially important new producer in the Leduc area is Continental-Leduc-Woodbend 3, LSD 12, 7-51-25w4, first well in the area to secure commercial production in the lower Cretaceous area. The test failed to get production in the D-2 zone and was deepened to 5,525 ft., halting in the green shale without reaching the D-3 zone. As this was below the water table, the hole was plugged back for a series of drill-stem tests of the lower Cretaceous between 4,179 and 4,211 ft., encountering gas and oil with some water. Oil flow is reported at the rate of 960 bbl. a day of 40°-gravity crude, grading much higher than the product normally encountered in the lower Cretaceous. Location is about 3 miles east and slightly south of the Imperial-Woodbend producers.

Globe-Leduc West 5, LSD 16, 34-50-26w4, which originally struck the D-3 zone on the water line, plugged back and drilled directionally to the south, where the formation is higher, reentering the D-3 at 5,103 ft. vertical depth. Drill-stem test at 5,151-59 ft. showed 517,000 cu. ft. gas flow

SOLVING MUD PROBLEMS

Case History #1

THE WICHITA MUD MIXER and CHEMICAL MIXER



Model 12
CONTINUOUS FLOW MIXER

New in Theory
Field Proven
Mud Economy
Flexible in Application

The Wichita Mud Mixer is a "must" for efficient, low-cost operation of a modern drilling mud system. Designed as a high capacity premixer and hydrator, the Wichita Mud Mixer disperses all types of mud and lost circulation materials. Greater mud and operating economy is attained due to low power requirements and minimum maintenance costs.

The Wichita Chemical Mixer embodies the same high engineering standards as the Wichita Mud Mixer, and provides a fast, safe method for preparing large quantities of chemical additives.

Complete Data on Request

with oil rising to the surface in eight minutes. Globe-Leduc West 6, LSD 3, 19-50-26w4, finished at 5,373 ft., got salt water in the D-3 and is plugging back to test D-2. Home-Leduc 11, LSD 6, 9-50-26w4, finished at 5,400 ft., showed initial potential of 63.3 bbl. an hour.

Imperial 81, LSD 16, 4-50-26w4, south end test, finished at 5,412 ft. with initial potential of 1,896 bbl. Imperial 82, LSD 16, 27-50-26w4, after drill-stem test, has run casing to 5,307 ft. and is being placed on production. Imperial 89, LSD 15, 21-50-26w4, finished at 5,060 ft., has established potential of 1,044 bbl. Several other tests are finishing for Imperial which has eight new locations in the Leduc field.

Southwest Viking.—In the southwest part of the old Viking gas field, Tower-Hillam 1, LSD 5, 18-42-13w4, has spudded as a joint test of holdings of 275,000 acres by Tower Petroleums, Imperial Oil, Anglo-Canadian and Husky Oil & Refining. Location is on a seismic high, with Devonian limestone estimated at 3,000 ft. Drilling will be carried to around 5,500 ft.

Lloydminster.—In the Lloydminster field, Superior 13, LSD 15, 14-50-2w4, finished at 1,967 ft., has 70 bbl. initial production. Superior 12, same LSD, at 1,961 ft. also started at 70 bbl. Westend 1, LSD 15, 11-50-2w4, at 2,010 ft. has been abandoned, after making some production. Imperial-H. B. 2, LSD 6, 9-50-1w4, at 2,001 ft. is bailing 20 bbl. of oil with some water. Commercial Oils 2, LSD 11, 14-50-2w4, at 1,985 ft. started at 50 bbl. and increased to 100 bbl.

APPALACHIAN FIELD

Peoples Natural Gas Co. Stakes Rank Wildcat

PITTSBURGH.—Peoples Natural Gas Co. has made location for a wildcat test on the Earl Barnhart farm in East Taylor Township, Cambria County, Pennsylvania, elevation approximately 2,240 ft. on the Johnstown Quadrangle, 1.9 miles south of latitude 78 degrees 45 minutes, 3.3 miles west of longitude 40 degrees 15 minutes and 4 miles southwest of the Bumford well completed dry last year at a depth of 3,528 ft.

In West Virginia, a successful wildcat completion was reported in Columbian Carbon Co. No. 1069 Leslie Thompson, in Steele district, Wood County, elevation 746 ft., testing 4,915,000 cu. ft. of gas after shot; Corniferous lime 4,733 ft., Oriskany sand 4,843-94 ft., gas at 4,845 ft., total depth 4,913 ft. This well is 1.6 miles northeast of the discovery well, the 1 Waterbury in Grant district, Jackson County. United Carbon Co., No. 3-1529 Nathaniel Waterbury is shut down at 5,029 ft., Corniferous lime 4,871 ft., Oriskany sand 4,923-5,028 ft., with a show of gas testing 15,000 cu. ft. at 4,993-94 ft.

In Wolf Creek district, Monroe County, Godfrey L. Cabot, Inc., is plugging an unsuccessful wildcat, the 1239 Margaret S. Twohig, elevation 1,715 ft., Corniferous lime 6,469-6,548 ft., show of gas 6,526 ft., Oriskany sand 6,548 ft., salt water at 6,593 ft., total depth. In Steele district, Wood County, Godfrey L. Cabot, Inc., No. 1281 John Hogue, elevation 998 ft., topped the Corniferous lime at 4,986 ft. In Grant district, Jackson County, Hope Natural Gas Co. No. 9230 Lee Batten, elevation 851 ft., is drilling at 4,867 ft. in the top of the Oriskany sand with gas showing at this depth testing 81,000 cu. ft.

Another oil well was reported in the Silverton pool in Ravenswood district, Jackson County, drilled by K. M. Hunt in the 3 Shirley McMurray testing 50 bbl. after shot in the Berea sand, total depth 2,123 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district: Columbian Carbon Co. 1,069 Thompson tested 4,915,000 cu. ft. of gas from Oriskany sand at 4,845-47 ft., TD 4,913 ft., elev. 746 ft.

WEST VIRGINIA WILDCAT FAILURE

Monroe County, Wolf Creek district: Cabot, Inc., 1,239 Twohig, dry, TD 6,593 ft., elev. 1,715 ft.

ROCKY MOUNTAIN

Powder River Basin Again Draws Interest

DENVER.—Eastern Powder River Basin drilling was again in the spotlight this week with the recovery of oil on drill-stem test by Pacific Western Oil Co. and National Associated Petroleum Co. at its Bridge Creek wildcat, west of Mule Creek field, in Niobrara County, Wyoming. The well is 1 Grimes-Government, NW NW SE 31-39n-61w, and is the operators' second well on the 15,000-acre block. The well cored saturation and oil was recovered on drill-stem test of the Dakota formation. However, after casing was cemented on top of the sand the operator tested mostly sulfur water, and testing is continuing. Dakota was found at 2,537 ft. and on drill-stem test 2,567-85 ft. the well made 450 ft. of dark green, 35°-gravity oil and 80 ft. of oil-cut mud in 15 minutes. A core between 2,585-95 ft. showed 10 ft. of saturated sand but it is believed this section produced the water recovered on test after casing had been run. This block was assembled by Pacific Western and National Associated several years ago. The operator's first well at 1 Grimes-State, SE SW NW 16-39n-61w, 3 miles northeast of the present test, was abandoned at 5,329 ft., total depth, through the Minnelusa. Staining was logged by this well in the Leo, but the sand tested water.

Gas was recovered on drill-stem test in the Frontier formation at Atlantic Refining Co. 1 Tribal, C SW SE 25-1s-4e (WRM), in the Riverton area north of Beaver Creek field in Fremont County, Wyoming. The test was made between 7,950-88 ft. and gas was recovered at the surface in 6 minutes, with the well gaging at the rate of 1,250,000 cu. ft. per day. The test was for a 30-minute period and flowing pressure was 850 lb. Top of the Frontier is reported at around 7,950 ft. and Atlantic is running intermediate string of casing to this point prior to drilling deeper on the test. Atlantic did extensive geophysical work in this area after obtaining a seismic option from the Wind River Agency in 1946. A total of 106,247 acres were included in the seismic option, of which Atlantic selected 5,116 acres for lease in the Riverton area. Stanolind, Superior, Kerr-McGee and Atlantic were subsequent bidders for lands in the area prior to drilling the present test. The well will probably test Dakota before completion of the well.

British-American Oil Producing Co.'s wildcat test in the Longs Creek area, southeast of Sand Draw field, is a failure in the Madison and the operator is now plugging back for more complete tests of the Embar formation. The well is 1 Government, C NW NE 5-31n-94w, and is at 6,306 ft., total depth, in the Madison. On drill-stem test 6,270-98 ft. the well made 4,950 ft. of black sulfur water in 30 minutes. The well had shown saturation in the Embar and Tensleep formations, but on test of the Tensleep the well also made water. Gas was recovered in the Embar, and oil saturation was found in cores, and the operator will now test this zone before completion of the well.

In west-central Colorado Pure Oil Co. is drilling below 6,300 ft. at its Gateway wildcat at 1 Unit, NW SW SW 15-15s-104w, Mesa County. At this depth the well is still reported in arkosic sand, possibly of the Cutler formation. The test is of importance as the first to be drilled on the northeast side of the Salt Basin of Colorado. Location was based on structural conditions as well as stratigraphic trap possibilities in the area. A large lease play extended from the Gateway area more than 80 miles southeast, following faulting in the area, into the Nucla area, where Continental, Lion, Pure, J. M. Huber and other operators hold acreage blocks. Drilling has been extremely difficult on the well, with boulders and arkosic sand drilled practically from the surface. It is reported that more than 300 bits have been used on the well to its present depth.

New locations.—There were a total of 26 new locations during the week, including 14 in Wyoming, 7 in Montana, 1 in Colorado, 3 in northern New Mexico and 1 in western South Dakota. In Wyoming there were two interesting wildcat locations. Phrillips Petroleum Co. announced location for 1 Golden Eagle, NW SE SW 12-45n-97w, for a 9,700-ft. Tensleep test on that structure. Gas was discovered in shallow sands on this structure a number of years ago and Dakota and Frontier sand production has been established, but the present test will be the first to the Tensleep. Northwest of the Lodgepole area in Weston County Esperado Mining Co. is grading roads for a 7,500-ft. Dakota sand test at 1 Government, C SE SW 16-45n-67w. Several important tests are scheduled for central Montana. General Petroleum Corp. announced location for 5-25-P, NW NW SW 26-16n-38e, in the Freedom Dome area of Garfield County and Phillips is moving in rotary for its 1 Alice Dome, C SE SE 9-13s-34e, between Porcupine Dome and Cat Creek fields. Both of these wells will probably test the Kibbey sand. The Texas Co. is moving in rotary for a 5,500-ft. Cambrian test in the Big Coulee-Hailstone Dome area at 1-D Northern Pacific, C SW SW 31-5n-20e. In the Barker area of southwestern South Dakota E. A. Lamb and J. M. Voice are preparing to spud at 1 Coffing, C NW NW 34-6n-2e, for a shallow test to the Leo (Pennsylvanian) sand. The three locations announced for the San Juan County, New Mexico, area are shallow Pictured Cliffs and gas tests.
the Wolf Creek area at 1,135 ft. after finding no shows in the Newcastle.

WILDCAT SUCCESS IN WYOMING

West Poison Spider, Natrona County: Pure 1 Unit, C NW SE 11-33n-84w, 14,309 TD, flowed 899 BOPD, ¾-in. choke, natural, acidized with 2,000 gal., flowed 408 BO 17 hours through ¼-in. choke. Mesaverde 7,280, Cody shale 9,800, First Frontier 14,142, 2nd Frontier 14,191. Elev. 5,937 ground, 5-in. liner 14,187, 7-in. casing 13,791.

WILDCAT FAILURES IN WYOMING

Moorcroft, Crook County: Texas 2 Robinson, NW SW SE 8-49n-67w, 5,353 TD, abnd., Frontier 1,718, Dakota 5,266. Elev. 4,304 KB.

Powder River, Natrona County: E. R. McElroy 2 LaFleiche, SW NW NE 25-36n-84w, 2,300 TD, abnd., Muddy 2,234.

Sulphur Creek, Uinta County: New Park Mining 4-A Bate, C SW SW 14-13n-119w, 725 TD, abnd., no tops available.

West Mule Creek, Niobrara County, H. Hillingsworth et al 1 Sedgwick, SE NW SW 35-40n-61w, 3,807 TD, abnd., hole junked, 1st Leo 2,370, 2nd Leo 2,440, 3rd Leo 2,785.

WILDCAT FAILURES IN MONTANA

Wolf Creek, Carter County: Hunt Oil 1 Gov't., C NE NE 20-8s-57e, 1,135 TD, abnd., Newcastle failure (no tops).

Blackleaf, Teton County, General Petroleum 1 Blackleaf, CSL SE NW 14-26n-9w, 7,571 TD, abnd. Madison 220, Devonian 1,610, Kootenai 1,745, Morrison 2,030, Ellis 2,230, Madison 2,545, Devonian 3,745, Madison 5,310, Madison 7,285.

Spring Hill, Teton County: Stephens Petroleum 1 Halverson, NW NE SE 34-27n-6w, 2,598 TD, abnd., Sunburst 2,340, Ellis-Madison 2,560, 7-in. casing 2,291.

SOUTH DAKOTA WILDCAT FAILURE

Fall River County: Olson 1 Nina, NE NE SW 2-10s-2e, dry, TD 3,070 ft., Leo 3,043 ft.

Completions in July Continue Record-Breaking Trend

by Polly De Armond

THE preliminary figures for July, one of the peak months in any year's drilling operations, continues the record-breaking trend already established for this year. Completions for the month reached 3,767, an increase of 486 wells, or 14.8 per cent, over the previous month, and an increase of 662 wells, or 21.3 per cent, over July 1947.

Successful searches for oil and/or gas numbered 2,393, a gain of 311 producers, or 14.9 per cent, over the preceding month, and 413 more producers, or a gain of 20.8 per cent, over the same period last year.

Footage comparisons with June 1948 reflect a 20.4 per cent increase of 2,216,740 ft., and a 24.8 per cent increase of 2,602,283 ft. over total footage drilled during the corresponding month of 1947.

The rigs and drilling figure showed a marked increase against July last year, with 429 more active rigs at the end of last month, but dropped 31 from June of the current year.

All of the areas but one made substantial gains in completions over last year. The greatest gain was reported for the Rocky Mountain region which increased 77.2 per cent in completions and 85.4 per cent in footage. The Pacific Coast had a 41.6 per cent gain in finished wells with a 9.5 per cent gain in footage. The Mid-Continent section of Kansas and Oklahoma was up 34.1 per cent in completions and 41.6 per cent in footage drilled. Total wells drilled in the Texas-New Mexico district rose 29.7 per cent over last year, and footage was up 33.5 per cent. The Southern states, including Louisiana, Arkansas, Mississippi, Alabama, Georgia, Florida and Tennessee, noted a 29.5 per cent increase in completions but a drop of 10 per cent in footage. The North Central area of Ohio, Indiana, Kentucky, Illinois and Michigan also had more completions but less footage, with an increase of 16.1 per cent in wells and a decrease of 41.1 per cent in footage. New York accounted for most of the decreases in the Eastern area, which reported a 15 per cent drop in completions and a 10 per cent drop in footage.

The total number of wells drilled in July also represents a new peak for completions during 1948, and surpasses the previous high mark of 3,281, established in June, by 486 wells. January's footage record was also bettered during July by more than 2,000,000 ft.

Comparisons with Last Month

Comparing July with June, the greatest percentage gain in completions was reported in the Rocky Mountain region, which had an increase of 41 wells for a 53.9 per cent gain. Texas and New Mexico completions reached 946 for the second highest percentage gain of 40.4 per cent, and the Southern states increased 91 wells, or 37.6 per cent. Smaller increases were recorded in the North Central area, up 39 wells, or 5.5 per cent, and the Eastern area, up 24 wells, or 5.2 per cent, while California reported two more wells than were completed during June. The Mid-Continent section was the only area to report a decrease, and was down 39 wells, or 12.9 per cent from the preceding month.

SUMMARY OF COMPLETIONS, JULY 1948

	Total comp.	Oil	Initial prod.	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	Over 10,000 ft.	Total footage	Rigs and drilling
New York	114	57	128	0	57	114	0	0	0	0	165,361	145
Pennsylvania	281	147	314	19	115	215	66	0	0	0	443,595	268
West Virginia	89	12	176	59	18	49	36	4	0	0	237,244	222
Ohio	108	33	656	36	39	58	49	1	0	0	257,397	107
Indiana	104	46	3,304	6	52	72	32	0	0	0	195,940	101
Kentucky	72	26	1,304	1	45	65	7	0	0	0	104,797	50
Illinois	279	143	17,446	1	135	76	203	0	0	0	741,303	238
Michigan	79	31	7,842	8	40	57	21	1	0	0	156,491	132
Kansas	293	137	47,472	56	100	38	250	5	0	0	941,591	381
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	0	0	0	12
Oklahoma	342	170	19,618	18	154	119	152	63	6	2	1,212,718	685
Texas	1,267	778	131,983	57	432	329	554	236	120	28	5,400,613	1,152
North	263	133	10,847	2	128	141	86	36	0	0	742,211	152
West Central	151	66	8,495	5	80	37	106	8	0	0	476,791	78
West	361	300	84,716	2	59	68	194	43	42	14	1,720,733	217
Panhandle	65	50	4,129	9	6	2	63	0	0	0	197,947	160
Eastern	60	30	3,970	9	21	4	19	26	11	0	335,724	93
Gulf Coast	192	109	13,196	18	65	16	52	66	46	12	1,173,636	241
Southwest	175	90	6,630	12	73	61	34	57	21	2	753,571	211
Louisiana	260	180	18,623	15	65	120	43	24	38	35	1,217,758	259
Northern	176	122	8,581	12	42	116	31	12	11	6	524,600	86
Southern	84	58	10,042	3	23	4	12	12	27	29	693,158	173
Arkansas	22	13	708	1	8	7	12	3	0	0	70,460	38
Mississippi	41	28	5,983	2	11	0	1	17	9	14	331,581	59
Ala., Ga., Fla.	¶10	1	5	0	9	0	6	1	1	2	39,219	8
Montana	31	21	1,424	3	7	24	7	0	0	0	91,827	57
Wyoming	61	37	11,061	0	24	11	36	12	1	1	238,050	195
Colorado-Utah	25	16	2,088	3	6	2	3	19	1	0	139,440	68
New Mexico	61	44	6,984	2	15	14	28	15	4	0	251,340	139
California	228	185	25,624	2	41	9	61	70	63	5	869,787	404
Total July 1948	3,767	†2,105	302,743	289	*1,373	1,379	1,587	471	243	87	13,106,512	‡4,720
Total June 1948	3,281	1,860	270,416	222	1,199	1,342	1,368	342	164	65	10,889,772	4,751
Total July 1947	3,105	1,682	319,583	298	1,125	1,311	1,198	538		57	10,504,229	4,291

*Includes 195 service wells: N. Y. 57, Pa. 111, Ohio 6, Mich. 9, Kans. 3, Okla. 4, No. Tex. 1, Tex. Pan. 1, Tex. Gulf 1, No. La. 1, So. La. 1. †Includes 27 distillate wells: Okla. 1, Tex. Gulf 7, No. La. 8, So. La. 5, Ark. 1, Miss. 5. ‡Includes all wells rigged up and/or drilling at end of month. ¶Includes Tenn. 4.

STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 21, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries										
													Cumulative total, 1948					
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	28	14	0	*14	32,507	987	1,004	0	0	0	0	0	0	0	0	0	0
Pennsylvania	47	20	3	†24	73,839	1,690	1,858	0	0	0	0	0	0	0	9	13	22
West Virginia	16	3	10	3	44,487	500	530	0	0	1	1	2	3	0	33	36	72
Ohio	30	7	13	‡10	68,607	875	835	0	0	0	0	0	2	0	9	20	31
Indiana	20	8	0	12	38,137	653	400	1	0	0	1	2	17	0	1	27	45
Kentucky	14	2	5	7	29,984	440	426	0	0	0	2	2	7	0	0	14	21
Illinois	70	42	0	28	172,424	1,474	1,289	1	0	0	12	13	31	0	1	225	257
Michigan	25	8	5	12	61,059	519	541	0	0	0	7	7	13	0	8	171	192
Kansas	54	36	5	13	185,209	1,929	1,642	1	0	1	7	9	37	0	5	269	311
Neb., Mo., Iowa	2	0	0	2	4,814	5	4	0	0	0	2	2	0	0	0	4	4
Oklahoma	98	52	12	‡34	371,347	2,600	2,617	4	0	2	5	11	83	7	20	405	515
Texas	237	146	5	86	1,061,368	7,439	5,742	7	1	1	46	55	212	21	65	1,295	1,593
North Central (Dist. 7-B & 9)	84	49	0	35	225,706	2,321	1,863	3	0	0	17	20	74	0	10	455	539
West (Dist. 7-C & 8)	54	42	0	12	252,773	2,014	1,376	3	0	0	2	5	47	0	2	142	191
Panhandle (Dist. 10)	12	9	2	1	40,053	400	272	0	0	0	1	1	0	0	2	7	9
Eastern (Dist. 5 & 6)	15	7	1	7	81,048	353	327	1	0	0	5	6	9	2	0	75	86
Gulf Coast (Dist. 2 & 3)	37	21	2	14	211,326	1,172	1,008	0	1	1	9	11	52	16	19	283	370
Southwest (Dist. 1 & 4)	35	18	0	17	250,462	1,179	896	0	0	0	12	12	30	3	32	333	398
Louisiana	43	30	1	12	164,736	1,423	908	1	2	0	7	10	30	20	3	137	190
Northern	33	24	1	8	81,210	950	508	0	1	0	4	5	3	2	0	69	74
Southern	10	6	0	4	83,526	473	400	1	1	0	3	5	27	18	3	68	116
Arkansas	8	2	0	6	27,333	183	173	0	0	0	3	3	5	0	0	58	63
Mississippi	9	7	0	2	57,161	255	310	1	0	0	2	3	3	1	3	55	62
Southeastern States	1	0	0	1	4,222	32	38	0	0	0	1	1	0	0	0	30	30
Montana	8	4	1	3	21,904	172	171	0	0	0	3	3	3	0	0	14	17
Wyoming	§22	15	0	§7	100,948	314	142	1	0	0	§5	6	19	0	1	35	55
Colorado-Utah	2	2	0	0	12,857	153	128	0	0	0	0	0	0	0	4	31	35
New Mexico	4	3	1	0	24,305	387	337	0	0	0	0	0	4	1	1	32	38
California	57	43	0	14	202,873	1,839	1,244	6	0	0	5	11	79	0	4	190	273
Total United States	795	444	61	290	2,760,121	23,869	20,339	23	3	5	109	140	548	50	167	3,061	3,826
Total previous week	770	431	54	285	2,701,733	23,074	19,670	10	3	4	103	120	525	47	162	2,952	3,686
Total August 23, 1947	669	374	52	243	2,223,646			15	6	5	82	108	435	56	134	2,511	3,136

Service wells included: *14, †21, ‡1. §Includes 1 So. Dak.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. (For detailed price changes in all fields see The Oil and Gas Journal, January 1, 1948, page 107.)

A.P.I. REFINERY REPORT, WEEK ENDED AUGUST 14

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	902	2,268	260	1,324	1,518	22,735	9,931	18,865	11,747
Appalachian:									
District 1	97	303	38	93	73	2,030	409	639	361
District 2	29	87	6	38	72	868	88	224	162
Ind., Ill., Ky.	893	3,374	348	1,040	1,107	19,817	4,057	9,542	5,697
Okla., Kans., Mo.	470	1,638	116	741	529	8,126	1,307	4,887	2,027
Inland Texas	229	933	72	189	393	3,227	629	1,008	882
Texas Gulf Coast	1,371	4,180	656	2,234	1,982	15,657	2,084	7,331	7,798
La. Gulf Coast	414	1,300	341	700	470	4,857	1,466	3,931	1,679
N. La. and Ark.	76	215	45	54	153	2,285	485	485	250
Rocky Mountain:									
New Mexico	12	44	7	12	27	74	25	30	29
Other Rocky Mtn.	157	478	34	194	272	2,028	266	1,185	955
California	885	2,669	127	890	2,336	14,930	932	13,331	36,936
August 14, 1948	5,535	17,489	2,050	7,509	8,932	96,634	21,679	61,458	68,523
August 7, 1948	5,584	17,669	2,126	7,044	8,981	97,838	21,055	59,869	66,911
August 16, 1947	5,239	16,507	1,985	6,047	8,675	85,656	18,636	47,935	53,644

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 221,655,000 bbl. as of August 14—up 1,400,000 bbl. One year ago 226,076,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.

East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 21 crude oil	B. of M. Aug. demand	Aug. 14 crude oil
Alabama	1,350	1,300	1,375
Arkansas	82,825	90,000	81,225
California	948,900	955,000	949,800
Colorado	47,140	50,000	46,640
Eastern	65,900	66,200	66,200
Florida	810	800	850
Illinois	176,400	170,000	178,300
Indiana	21,100	16,000	19,400
Kansas	307,250	306,000	301,350
Kentucky	25,700	25,000	24,000
Louisiana	481,550	500,000	482,300
North Louisiana	112,350	.....	113,100
South Louisiana	369,200	.....	369,200
Michigan	47,300	46,000	44,900
Mississippi	127,320	130,000	123,925
Montana	25,290	27,000	25,300
Nebraska	400	700	400
New Mexico	132,960	138,000	132,960
Oklahoma	428,800	438,000	424,250
Texas	2,446,600	2,540,000	2,446,600
Dist. 1 (Southwest)	29,005	.....	29,005
Dist. 2 (Southwest)	178,900	.....	178,900
Dist. 4 (Southwest)	250,375	.....	250,375
Dist. 3 (Gulf Coast)	493,420	.....	493,420
Dist. 5 (Eastern)	49,575	.....	49,575
Dist. 6 (Eastern)	120,000	.....	120,000
East Texas field	304,000	.....	304,000
Dist. 7-C (West)	43,600	.....	43,600
Dist. 8 (West)	703,050	.....	703,050
Dist. 7-B (W. Central)	50,725	.....	50,725
Dist. 9 (N. Central)	137,850	.....	137,850
Dist. 10 (Panhandle)	86,100	.....	86,100
Wyoming	152,830	160,000	151,560
Total United States	*5,520,425	5,660,000	5,501,335

Change from prev. wk., up 19,090

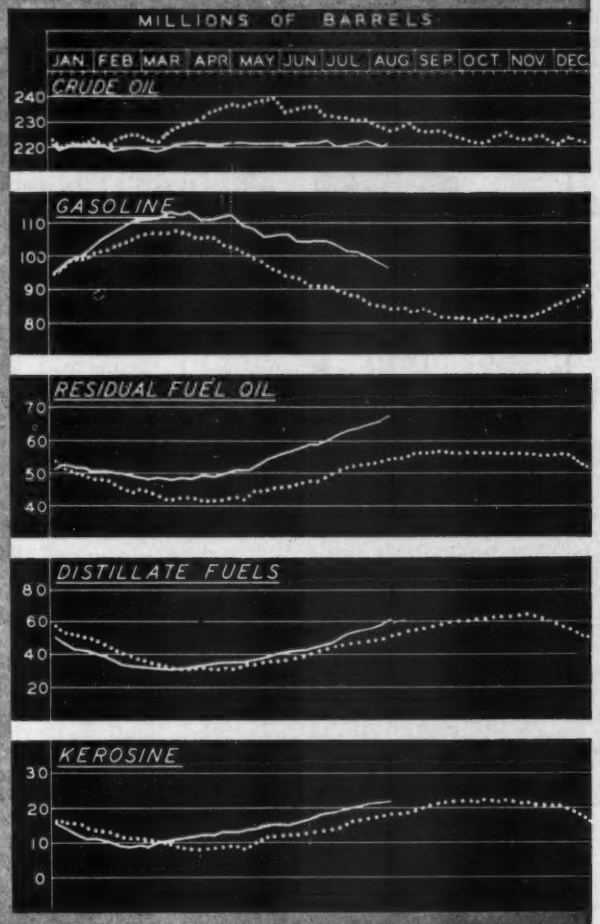
Total production January 1-August 21 .. †1,282,025,440 bbl.

Same period last year (crude plus cond.) 1,157,135,190 bbl.

*Not. incl. 71,115 bbl. condensate. †Incl. 17,352,280 bbl. condensate.

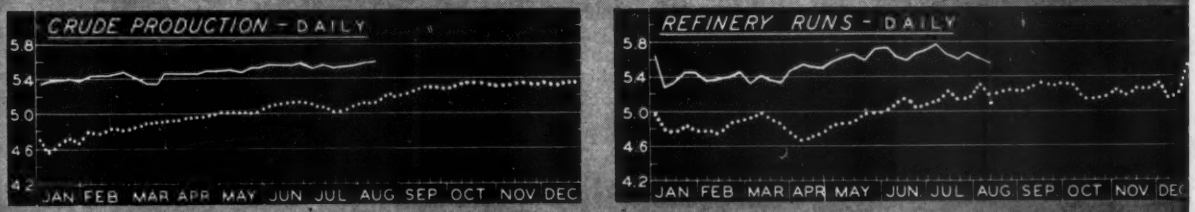
STOCKS IN UNITED STATES

---- 1947 ——— 1948



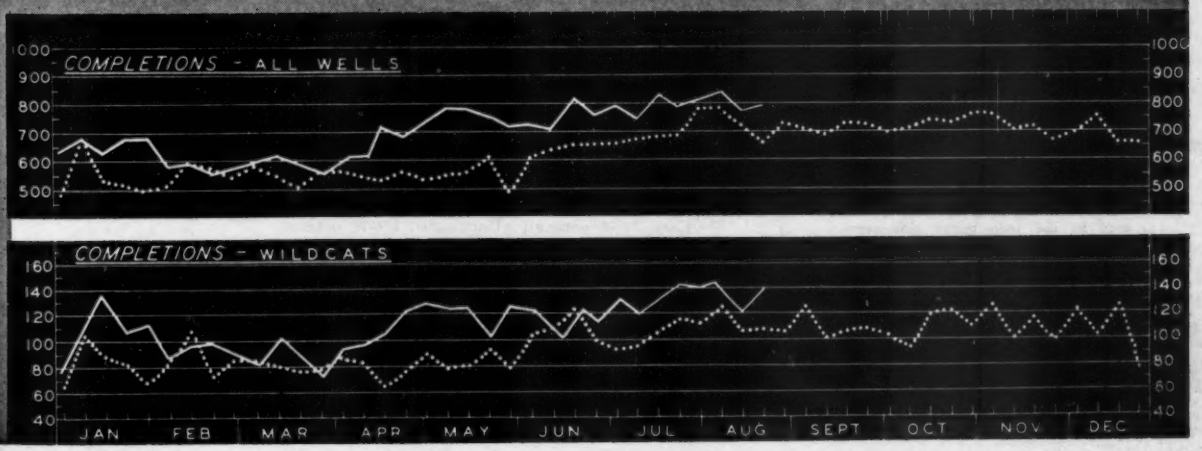
DAILY OPERATIONS

---- 1947 ——— 1948

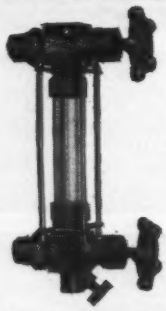


WEEKLY COMPLETIONS

---- 1947 ——— 1948



PENBERTHY
"ALL IRON"
LIQUID LEVEL GAGES



Body made from a special high strength alloy iron, shanks alloy steel and trim stainless steel. Extra heavy construction throughout, automatic and positive shut-off if glass breaks, heavy duty stuffing boxes. Conform with A.P.I.—A.S.M.E. requirements.

The "All Iron" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

LOOK

FOR THIS CAN ON YOUR SUPPLY STORE SHELF

Use it on every threaded connection and you'll never be troubled with leaking connections. Over a million pounds used by the Industry in nine years.

Manufactured in Houston, Texas, by
RECTOR WELL EQUIPMENT CO., Inc.
Gen'l. Offices: Fort Worth, Texas

RECTORSEAL
THE POSITIVE LEAK PREVENTER

MARKETS

SPOT-MARKET traders in petroleum products on the Gulf Coast last week reported demand for all material extremely weak and prices at or below publication levels. One dealer declared the bottom had "dropped out" of the market. Barring extremely cold weather or heavy increases in government buying, the heating-oil situation this winter will be entirely different from last winter's tight supply, he predicted.

Gasoline at 10½ Cents

Motor fuel was moving at about 10½ cents per gallon for regular, tank car. For water movement, motor fuel was bringing 12 to 12¼ cents. Very little in the burning-oil class was being placed on the market. No. 6 continued in oversupply with prices ranging around $2. One marketer said refiners were continuing to ask prices higher than the market in its present condition justified.

Spot offerings of gasoline in the Mid-Continent area were reported last week to be somewhat more frequent while demand continued firm, and although price levels remained the same they appeared to be narrowing more in range. One Oklahoma supplier purchased five cars of housebrand gasoline, East Texas, at 10⅝ cents per gallon.

No softening in demand for gasoline in the Mid-Continent area was reported, but some observers declared that a few buyers were cutting down on their purchases of gasoline for storage in order to make way for storage of heating and light burning oils. One large refiner last week increased his posting of spot tank-car price for housebrand gasoline, f.o.b. Group 3, from 10⅜ to 10⅝ cents per gallon.

Observers generally last week felt that the market is fast approaching a more "normal status"—with supply and demand in near balance—if such a condition is not already attained. Although not denying the possibility of a shortage of needed products this winter, most marketers were firm in their belief that peak production and high storage levels have definitely made any chance of shortage unlikely. And if occasional spot shortages should appear they would be quickly relieved.

No. 6 Continues Weak

The market for No. 6 residual oil continued to be the weakest of all petroleum products, but according to one supplier, "purely a seasonal weakness." Nevertheless, another large supplier reduced his quotation for spot sales of heavy fuel oil from $2.30 to $2.20 Group 3.

Several spot offerings of furnace oils were reported by one buyer at "prevailing prices," for shipment between now and September 15. No. 2 continued fairly active at prices ranging from 9 to 9¼ cents per gallon.

Spot sales of petroleum products in New York Harbor last week continued quiet, it was reported. And general opinion was that no major developments would take place before the first of September, at which time two major marketers are scheduled to withdraw their 0.7 cent per gallon summer discount on home heating oil prices.

Observers in this area were speculating as to whether prices among the major companies in New York and New England next fall might return to the customary one-price level instead of the three now existing in the same marketing areas.

Representative Quotations

Representative spot-market quotations of leading suppliers as of August 23, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10¼-11	11.6-12* 10.3-11.9†	10.9-11½
Premium gasoline, 78-80 octane	11½-12	10.6-13.4	12.9-12¾
42-44 w.w. kerosine	9½-10	10.3-11.9	10¼-10
No. 2 straw fuel oil	9.9¼	9.4-10.9	9.05-9½
No. 6 residual	$2.10-2.30	$3.03-3.37	$2.20-2.65

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-21

LUBRICATING OILS

Mid-Continent

150-160 vis., *D* bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	45

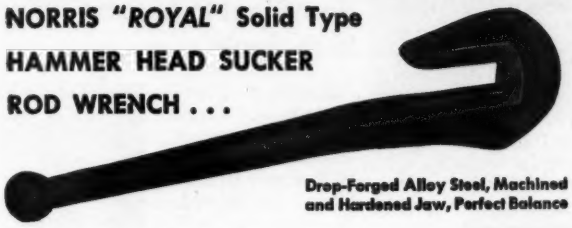
CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	6¼-6½

BUILT TOUGH
To Take Plenty of Punishment!

NORRIS "ROYAL" Solid Type HAMMER HEAD SUCKER ROD WRENCH . . .



Drop-Forged Alloy Steel, Machined and Hardened Jaw, Perfect Balance

NORRIS "BUMP-UP" Hinged Type SUCKER ROD WRENCH . . .

Drop-Forged, Heat-Treated Alloy Steel Jaw; Perfect Balance; Opening Machined to Exact Dimensions

AT YOUR FAVORITE SUPPLY STORE

Norris Brothers, INC.
ROBINSON · ILLINOIS

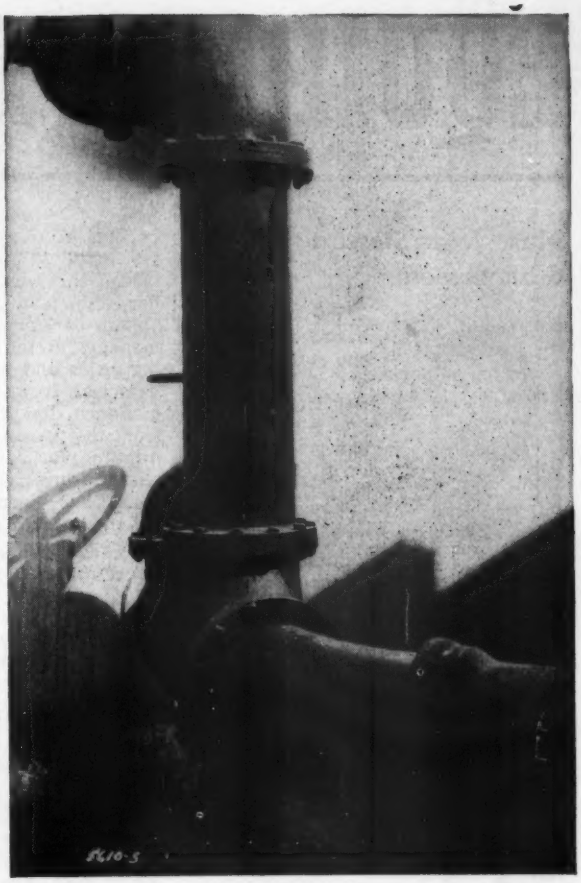
A Better Strainer! —by DAVIS

—with BOLTED CAP

Bolted cap construction is used in sizes from 1½" to 12".

If you think all strainers are alike, ASK THE MAN WHO HAS TO GET INTO THEM! Davis builds strainers with bolted caps (instead of threaded caps) because numerous engineers have asked for them. It's easier to remove bolts than to try to unscrew a large thread cap after a strainer has been in use. Also makes possible locating blow-off at lowest point; no sediment pocket. Don't confuse Davis precision-made strainers with ordinary pipe fittings. Available in wide choice of types for steam, air, gas, or fluids. Semi-steel, bronze, or steel bodies; screwed or flanged. Pressures to 1500 p.s.i. Brass, stainless or monel trim. Ask for bulletin H-80.

DAVIS VALVES
DAVIS REGULATOR COMPANY
2543 South Washtenaw Ave., Chicago, Ill.
Distributor: Westcott & Greis, Inc., Tulsa and Houston



AN ALLY IN THE BATTLE OF MAINTENANCE COST

Oil refinery operation is known for close control of maintenance cost. One of the factors in keeping this cost low is the dependable, durable service of cast iron pipe. For such refinery services as salt water disposal, cooling and condensing coils, rundown lines, discharge lines, and water and fire protection lines, the cost of cast iron pipe per service-year is low. Measured by that *real* cost, it is cheapest in the end. Available in bell-and-spigot, plain end or flanged, or with standardized mechanical joints. Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 1015 Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON PIPE
FOR LONG LIFE AND ECONOMY

EQUIPMENT MEN ... in the News

Muse Joins Stewart & Stevenson

Willard B. Muse has recently joined the staff of Stewart & Stevenson Services, Houston, and is in complete charge of promoting Continental Red Seal engines in the State of Texas for that organization. For 17 years, Muse was associated with the Ford Motor Co. sales-promotion division, and for 10 years thereafter he was connected with the power-unit business handling Continental engines. He was Southwest sales manager for Continental and initiated the establishment of a Continental distributor organization in seven states. He is also instrumental in pioneering the manufacture of power units by Continental, and was one of the first to put a Continental engine on an air-conditioning job.

Moore Elected Vice President

At a board of directors meeting held recently, Whitley B. Moore was elected vice president in charge of sales of Timken Roller Bearing Co., succeeding L. M. Klinedinst, who, after 43 years of service, retired. Klinedinst will remain a director of the company and further serve as sales consultant.

Moore, after graduating in 1919 from University of Michigan's engineering school, served in the Navy. When he came with the company he was first assigned to factory equipment engineering and later was transferred to the Pacific Coast in charge of sales and engineering for all territory west of the Rocky Mountains. Later he was moved to Canton as assistant general manager of the industrial bearings division and later became manager of that division. During World War II Moore had charge of steel sales division and about 3 years ago was appointed director of all sales.

Klinedinst joined the company in 1905, coming from York, Pa. He was a lock maker at York Safe & Lock Co. His first position was assistant chief inspector. He rose progressively through the shop to the positions of chief inspector, assistant superintendent having charge of shipping, stores, stock follow-up, etc., later was assigned to assistant production manager and later production manager, and in January 1916 was made sales manager of the division manufacturing axles and boxes for horse-drawn vehicles. It was largely through his guidance that the company branched from the wagon and automotive field into the farm-implement and industrial business, which in the last 25 years has been chiefly responsible for the growth and expansion of the Timken bearing business.

H. C. Smith Names Ruse

DALE RUSE

Appointment of Dale Ruse as division manager of Texas and New Mexico for the H. C. Smith Oil Tool Co. has been announced by Ronald C. Smith, general sales manager. Ruse will make his headquarters at Odessa. He has been with the company for the past 11 years and was formerly branch manager at Oklahoma City.

Koppers Consolidates Two Divisions

Gen. Brehon Somervell, president of Koppers Co., Inc., announces the resignation of Allen W. Morton as vice president and general manager of the company's piston-ring division. At the same time he announced the consolidation of two company divisions to form a new metal products division.

The new division is composed of the former shops division and the former piston-ring division, all manufacturing activities of which will continue to be carried on in Baltimore, under the direction of Walter F. Perkins, vice president and general manager.

Manly Succeeds Meyer

W. L. Manly has been appointed manager of dealer sales of the Allis-Chalmers Mfg. Co., succeeding W. A. Meyer, who has been named assistant manager of the Texrope Drive department, according to an announcement by W. C. Johnson, vice president of the Allis-Chalmers general machinery division.

New Plant to Locate In St. Louis

G. B. McCOMB

Standard Pipe-protection, Inc., has purchased a 20-acre site at 3000 South Brentwood Boulevard, St. Louis, and will shortly begin construction of a 70,000-sq.-ft. plant. The plant will contain modern coating and wrapping equipment for the protection of small-diameter steel pipe, and is expected to cost approximately $500,000. In addition, a modern office building will be constructed, which will be headquarters for the company. President of the company is George B. McComb, Summit, N. J., and vice president is Hugh W. Baird, Evanston, Ill. John B. Wilson, Tenafly, N. J., is secretary-treasurer. All three men were formerly associated with the Barrett Division of Allied Chemical & Dye Corp., New York. McComb was general sales manager, Baird was regional district manager in Chicago, and Wilson was executive assistant to McComb.

The plant is expected to be in operation by January 1, and initially will employ about 100 workers. The firm is capitalized at $1,250,000 under the laws of Delaware.

Texoma Elects Officers And Directors

At a recent annual stockholders' meeting of Texoma Supply Co., held in Tulsa, the following officers were elected: C. J. Hochenauer, president-treasurer; James M. Cleary, executive vice president; Ray H. Smith, vice president in charge of sales; and Warren A. Read, secretary. These officers, plus Richard Tull, constitute the board of directors.

Texoma Supply Co. has been serving the oil industry for many years and represents a broad line of tubular goods and oil-field supplies for the drilling, producing, pipe-line, and refining divisions of the industry. The company's headquarters and general offices are located in Tulsa, with branch offices maintained at Fort Worth and Houston. Texoma was recently appointed exclusive distributors for Texasteel Manufacturing Co.'s line of sucker rods and allied products.

Oil Well's District Office to Wichita

The Kansas district office of Oil Well Supply Co. has been moved from Great Bend to Wichita, M. Barkhurst, manager of this U. S. Steel subsidiary's Mid-Continent division, announces. F. G. Irick, district representative, will remain at Great Bend in charge of the sales office. T. E. Dawson is manager of the Kansas district.

In personnel changes also announced by Oilwell's Mid-Continent division manager, Royal F. Shaner was promoted to district engineer for the Oklahoma district, with headquarters at Oklahoma City, and W. O. Williams was appointed manager of the Madill, Okla., store, succeeding L. G. Hutchison, who was transferred to Healdton, Okla., as field representative.

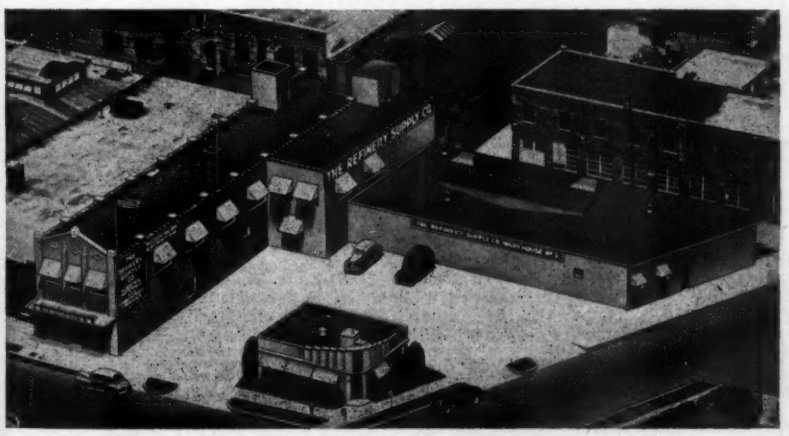
Parker and Gaut Store Managers

John Herman Parker has been named manager of Oil Well Supply Co.'s Borger, Tex., store and Perry O. Gaut has resumed his duties as manager of the Pampa, Tex., store after an illness of several months.

Refinery Supply Opens Warehouse No. 2

W. A. Schlueter, president of Refinery Supply Co., Tulsa, has announced the completion of a new warehouse, adding over 5,000 sq. ft. of floor space to storage. This new building is now completely stocked with finished material and distribution items. The additional investment is well over $100,000.

Future plans contemplate extending the main building down Fourth Street, east to the corner. It would be used exclusively for the manufacture of the new R.S. Liquid Recording Gravitometer. Also it is planned to use the small building, in the center of the picture, as a company cafeteria.



Headquarters of Refinery Supply Co. in Tulsa

Weatherford Spring Co., Weatherford, Tex., manufacturers of oil-well-cementing tools and other specialty items, announce the purchase of seven Beechcraft Bonanzas to facilitate the operations of its field men and to speed delivery of materials vital to oil-well-completion jobs. In the accompanying photograph, officials of the Weatherford company are seen accepting delivery of these planes from Beech Aircraft Corp. at Wichita. From left to right: Lee H. Smith, sales manager, Beech Aircraft Corp.; Frank M. Hover; J. D. Reed, Beechcraft distributor in Dallas; Walter Beech, president and chairman of the board, Beech Aircraft Corp.; Jess E. Hall, Jr., general manager Weatherford Spring Co.; Jess E. Hall, Sr., owner, Weatherford Spring Co.; John A. Hall, sales manager, Weatherford Spring Co.; and Chester B. Hairston

Tube Turns Establishes Tulsa Warehouse

Tube Turns, Inc., Louisville, Ky., has established a modern factory warehouse in Tulsa, at 317 South Detroit Avenue. There, customers can get prompt delivery of Tube-Turn welding fittings and flanges from large and complete stocks.

Robert S. Tyler, Mid-Continent district manager for Tube Turns, Inc., who formerly had his office at 311 Tuloma Building, is in charge of the new project. William R. Emrich, who was transferred from the Louisville sales department to Tulsa, is chief clerk. W. J. Hamilton is the factory-trained warehouse foreman.

Aero-Coupling Corp. Formed

It has recently been announced that Aero-Coupling Corp. of Burbank, Calif., is operating under license issued by Aeroquip Corp. of Jackson, Mich. Aero-Coupling now has available a full line of hose fittings and flexible hose lines for aircraft, hydraulic, and power-plant installations.

FWD Accelerates Development

D. B. OLEN

Announcing a number of changes of personnel in its engineering division Four Wheel Drive Auto Co. announces an acceleration in its development program, both modernization of its present standard models and development of new models.

Donald B. Olen, formerly chairman of the manufacturing committee, has been named director of the engineering division and H. B. Dodge, former director, has been elevated to technical adviser to the management of the company. G. D. Simonds, formerly manager of design engineering, has been named chief engineer in charge of design of standard FWD Models.

B. G. Donley is manager of development engineering concentrating his efforts on specialized products.

James A. Sorenson, metallurgist for the company for more than 30 years, has had added to his responsibilities those of research engineer.

The first responsibility of FWD's engineering division is the completion of FWD's 5-year plan to bring the entire standard line up to the status of the company's recently announced model ZU. Work is proceeding a top speed on the drawing boards of the engineering division to accomplish this goal in the shortest possible time.

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UNDISPLAYED
All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

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$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
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EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: Wilson Super Model Winch powered by 6 MZR Waukesha engine. Terms. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: 110 Cleveland Trencher and Trailer, almost new. Lewis Stucker, 918 N. Market, Wichita, Kansas. Phone 5-6397.

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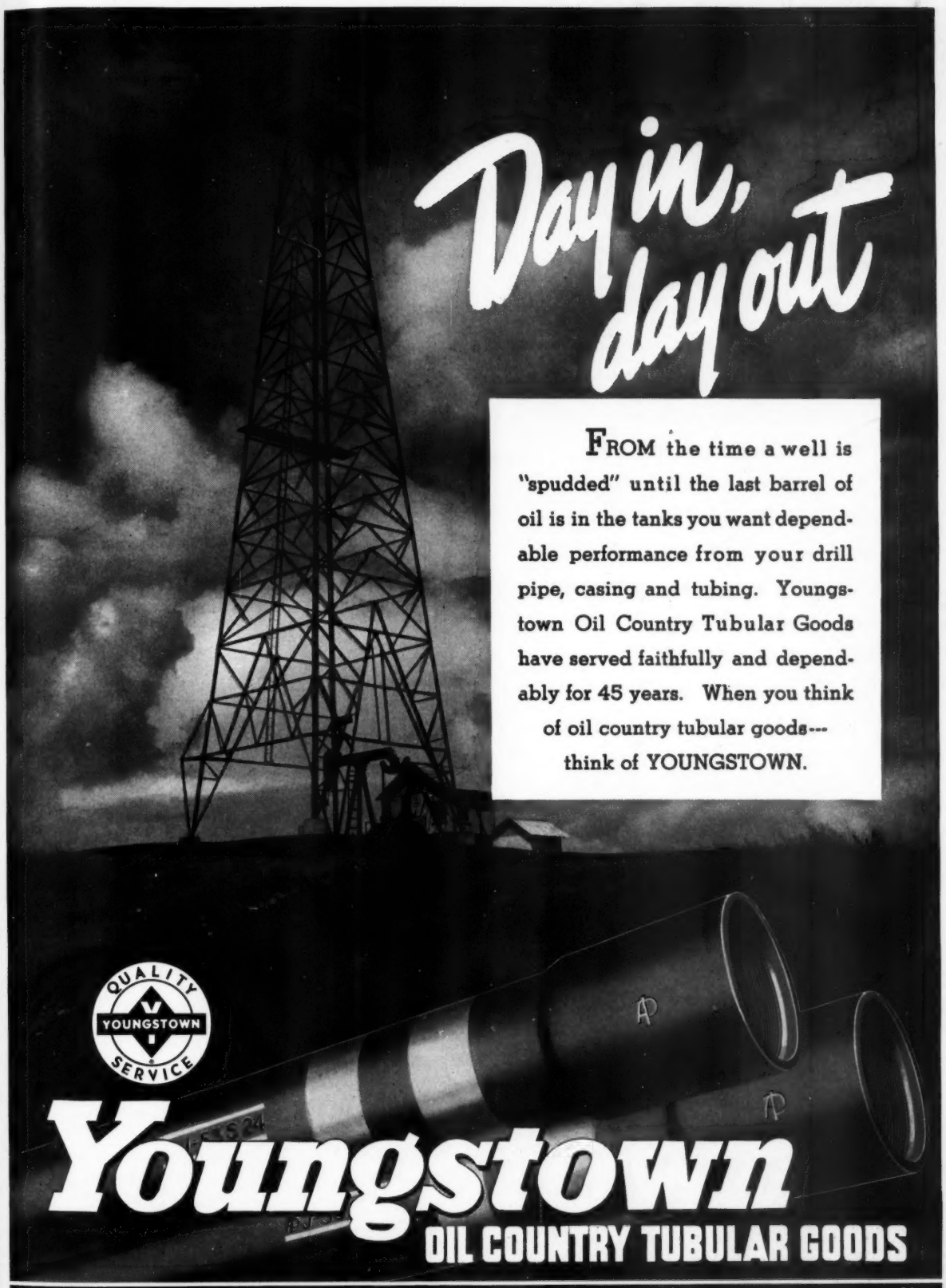
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